Anritsu

SERVICE MANUAL

MICROWAVE SYSTEM ANALYZER

ME453K/L/M
ME538K/L/M

1988.03 x 80 NVII-13(Y)
Printed in Japan

CERTIFICATION

ANRITSU CORPORATION certifies that this instrument has been thoroughly tested and inspected, and found to meet published specifications prior to shipping.
Anritsu further certifies that its calibration measurements are based on the Japanese Electrotechnical Laboratory and Radio Research Laboratory standards.

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NOTES

(1) The instrument is operable on a nominal voltage from 100 to 127 Vac or from 200 to 250 Vac by changing the connections of the power transformer taps.

The voltage and current rating are indicated on the rear panel when the instrument is shipped from the factory.

In the case of other voltage operation, change the connections of the power supply transformer, and the plate of voltage and current designations on the rear panel should be changed to suitable one. Order the plates from ANRITSU CORP. if needed.

(2) In this manual, power supply voltage and current rating are represented by [**] Vac, [***] A, and [****] A.

(3) The relation between power supply voltage and current rating is listed below.

** Vac	(Transmitter) *** A	(Receiver) **** A
100 to 127 V	2 A	3.15 A
200 to 250 V	1 A	2 A

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SECTION 1

GENERAL INFORMATION

1.1 INTRODUCTION

This manual contains the service information required to maintain the MICROWAVE SYSTEM ANALYZER ME453K/L/M and ME538K/L/M. It includes performance checks, troubleshooting techniques, adjustment, calibration procedures and repairs.

1.2 MAINTENANCE PERIOD

This test equipment is designed to permit stable performance over a long life. However performance may very due to stress and changes in the operating conditions. To use the Test Equipment in its initial condition, periodic maintenance and checks are required. If any problems occur, repair them in accordance to this service manual or contact the nearest ANRITSU service department.

1.3 ORDERING REPAIR PARTS

Parts required for repair should be ordered as explained in paragraph 6.4.

1.4 DISTINCTION BETWEEN PERFORMANCE CHECK AND CALIBRATION

How to check that the test equipment operates normally:

(1) Check that all functions are performed normally as explained in Section 2.

(2) Calibrate the levels and frequencies by referring to Section 4.

1.5 SPECIFICATION

Tables 1-1 and 1-2 list the specifications of this test equipment.

Table 1-1 SPECIFICATIONS

Measurements

Items	Models	ME453K/L/M	ME538K/L/M	
		70 MHz Band	70 MHz Band	140 MHz Band
Amplitude (IF INPUT terminal)	Inherent Slope	±0.05 dB/±25 MHz	±0.05 dB/±25 MHz	±0.05 dB/±25 MHz, ±0.1 dB/ ±40 MHz, ±0.2 dB/±50 MHz
	Measuring Range	0 to 16 dB		
	Max Sensitivity	0.01 dB/DIV (at Y2 Display)		
	IF INPUT Level	+10 to −20 dBm		
Amplitude (RET. LOSS INPUT terminal)	Inherent Slope	±1 dB		
	Measuring Range	0 to 8 dB		
	Sensitivity	1 dB/DIV, 5 dB/DIV		
	INPUT Level	−60 to −20 dBm		
Group Delay	Inherent Slope	0.3 ns/±15 MHz, 0.5 ns/ ±25 MHz	0.3 ns/±15 MHz, 0.5 ns/ ±25 MHz	0.3 ns/±20 MHz, 0.5 ns/±30 MHz, 1 ns/±50 MHz
	Measuring Range	0 to 400 ns		
	Max Sensitivity	0.1 ns/DIV (at Y2 Display)		
	Noise	0.05 ns/Condition; f_M = 200 kΩ ~ 278 kHz, Deviation 200 kHz rms, Using Average function.		
Linearity	Inherent Slope	0.2%/±25 MHz	0.2 %/±25 MHz	0.2 %/±50 MHz
	Measuring Range	0 to 80 %		
	Max Sensitivity	0.05 %/DIV		
	Noise	0.01 %/Condition, f_M <1 MHz, Deviation 200 kHz rms, Using Average function.		
Differential Phase	Inherent Slope*1	0.3°/±15 MHz, 0.5°/±25 MHz	0.3°/±15 MHz, 0.5°/±25 MHz	0.3°/±20 MHz, 0.5°/±30 MHz, 0.8°/ ±50 MHz
	Measuring Range	0 to 40°		
	Max Sensitivity	0.2°/DIV		
	Noise	0.02°/Condition, f_M = 5.6 MHz, Deviation 500 kHz rms, Using Average function.		
		*1: Specified frequency range = Carrier sweep width + 2 f_M		
Differential Gain	Inherent Slope*2	0.2 %/±15 MHz, 0.4 %/ ±25 MHz	0.2 %/±15 MHz, 0.4 %/ ±25 MHz	0.3 %/±20 MHz, 0.4 %/±30 MHz, 0.6 %/±50 MHz
	Measuring Range	0 to 80 %		
	Max Sensitivity	0.05 %/DIV		
	Noise	0.01 %/Condition, f_M = 5.6 MHz, Deviation 500 kHz rms, Using Average function		
		*2: Specified frequency range = Carrier sweep width + 2 f_M		
IF Return Loss	Frequency Range	70 ±25 MHz	70 ±25 MHz	140 ±50 MHz
	Measuring Range	10 to 50 dB accuracy depends on using bridge.		
	Sensitivity	1 dB/DIV, 5 dB/DIV		
AM to PM Conversion	Residual PM	0.3°/dB/±25 MHz	0.3°/dB/±25 MHz	0.3°/dB/±35 MHz
	Measuring Range	0.3°/dB to 16°/dB		
Spectrum	Center Frequency	70 ±20 MHz Auto tuning	70 ±20 MHz Auto tuning	140 ±30 MHz Auto tuning
	Sweep Width	Approx. ±700 kHz		
	Max Sensitivity	Detects 0.1 dB change of modulating signal at carrier zero point.		
	Deviation	K type – 340 kHz rms at 200 kHz, L type – 472 kHz rms at 277.778 kHz, M type – 425 kHz rms at 250 kHz.		

Table 1-1 SPECIFICATIONS (Cont'd)

<table>
<tr><td rowspan="3">Deviation</td><td>Measuring Range</td><td colspan="5">20 kHz to 999 kHz rms at built-in BB frequencies ≦ 8.2 MHz.</td></tr>
<tr><td>Accuracy</td><td colspan="5">10 % at built-in BB frequency ≦ 8.2 MHz.</td></tr>
<tr><td>Calibration</td><td colspan="5">Deviation meter is calibrated by easy key operation. Accuracy reaches 1 % theoretically at specified modulation frequency. Deviation is as shown in the following table by Bessel zero method.
<table>
<tr><th>Model</th><th>Modulation freq.</th><th>Key in factor</th></tr>
<tr><td>K type</td><td>200 kHz</td><td>340 kHz rms</td></tr>
<tr><td>L type</td><td>277.778 kHz</td><td>472 kHz rms</td></tr>
<tr><td>M type</td><td>250 kHz</td><td>425 kHz rms</td></tr>
</table></td></tr>
<tr><td rowspan="2">Modulator Sensitivity</td><td>Mod Signal Level</td><td colspan="5">−50 to +10 dBm</td></tr>
<tr><td>Deviation</td><td colspan="5">Use the DEVIATION meter function or use the carrier zero deviation with the SPECTRUM function.</td></tr>
<tr><td rowspan="2">De-modulator Sensitivity</td><td>IF Signal</td><td colspan="5">Calibrate the deviation with DEVIATION meter function or SPECTRUM function.</td></tr>
<tr><td>Demo BB Level</td><td colspan="5">−50 to +10 dBm</td></tr>
<tr><td colspan="2" rowspan="3">Inherent Noise (IF to IF)
(For all models)</td><td>Group Delay</td><td>Linearity</td><td>Differential Phase</td><td>Differential Gain</td><td></td></tr>
<tr><td>66 kHz to 93 kHz:
0.3 ns rms
200 kHz to 278 kHz:
0.1 ns rms
400 kHz to 556 kHz:
0.05 ns rms</td><td>0.02% rms</td><td>0.05 °rms</td><td>0.1% rms</td><td>Detection Band: 3 kHz</td></tr>
<tr><td colspan="2">Deviation: 200 kHz rms, f_M < 1 MHz</td><td colspan="3">Deviation: 500 kHz rms,
f_M = 5.6 MHz</td></tr>
</table>

BB (Baseband) measurement

<table>
<tr><td rowspan="5">BB to BB Measurements (For all models)</td><td>Item</td><td>Inherent slope</td><td>Measuring range</td><td>Max. sensitivity</td><td>Noise</td></tr>
<tr><td>Group Delay</td><td>0.1 ns</td><td>0 to 400 ns</td><td>0.1 ns/DIV (at Y2)</td><td>0.2 ns</td></tr>
<tr><td>Linearity</td><td>0.1 %</td><td>0 to 80 %</td><td>0.05 % DIV</td><td>0.05 %</td></tr>
<tr><td>Differential Phase</td><td>0.1 °</td><td>0 to 40 °</td><td>0.2 °/DIV</td><td>0.05 °</td></tr>
<tr><td>Differential Gain</td><td>0.1 %</td><td>0 to 80 %</td><td>0.05 %/DIV</td><td>0.05 %</td></tr>
<tr><td colspan="2">Measuring Condition</td><td colspan="4">BB level: −30 dBm</td></tr>
<tr><td rowspan="2">BB Return Loss</td><td>Frequency</td><td colspan="4">Built-in BB frequency or BB amplitude option</td></tr>
<tr><td>Range</td><td colspan="4">10 to 40 dB, 1 dB/DIV (BB amplitude option)</td></tr>
<tr><td colspan="2">BB Amplitude (Option)</td><td colspan="4">Frequency range: 60 kHz to 15 MHz, Level: +10 dBm to −50 dBm, Inherent slope:
Inherent slope: ±0.5 dB/100 kHz to 13 MHz
Measuring range: 0 to 8 dB, Max. sensitivity: 0.1 dB/DIV</td></tr>
<tr><td colspan="2">DC Input</td><td colspan="4">Measuring range: 0 to ±400 mV, Max. sensitivity: 1 mV/DIV</td></tr>
</table>

Table 1-2 SPECIFICATIONS

Receiver

IF Input	Frequency Range (AFC capture and hold range)	70 MHz band: 45 to 95 MHz 140 MHz band: 90 to 190 MHz When BB frequency is 55.6 kHz (or 27.8 kHz). *1 70 MHz band: 60 to 80 MHz 140 MHz band: 130 to 150 MHz
	Level Range	+10 to −20 dBm
	Level Display	3-digit LED display Resolution: 0.1 dB
	Level Accuracy	±0.3 dB at +4 dBm
	Impedance	75 Ω Return Loss: >30 dB at +4 dBm
	Input Frequency Sweep Width	
	Maximum Sweep Width	±25 MHz/center frequency 70 MHz ±50 MHz/center frequency 140 MHz When BB frequency is 55.6 kHz (or 27.8 kHz). ±10 MHz/center frequency 70/140 MHz.
	Minimum Sweep Width	The minimum sweep width required for reproducing the HOR signal on the CRT ±0.2 MHz
	Demodulation	66.6 kHz, 80 kHz to 8.2 MHz *1 BB frequency 55.6 kHz (or 27.8 kHz) is demodulated when sweep frequency is only 18 Hz.
IF Return Loss Input	The return loss input is used with the same frequency applied to IF INPUT to lock the AFC loop.	
	Input Level Range	−20 to −60 dBm
	Flatness	±1 dB/45 to 95 MHz ±1 dB/90 to 140 MHz
	Impedance	75 Ω Return Loss: >28 dB
BB Input (BB + Sweep)	BB Frequency Range	66 kHz to 15 MHz
	BB Level Range	+10 to −50 dBm
	BB Level Display	3-digit LED display Resolution: 0.1 dB
	BB Level Accuracy	±0.3 dB at 0 dBm
	Impedance	75 Ω Return Loss: >28 dB at 0 dBm/frequency 66 kHz to 15 MHz
	Sweep Frequency Range	18 to 100 Hz
	Sweep Voltage Range	±50 mV to ±5 V
	X Phase Setting Range	0 to 360 °

*1 Optional

Table 1-2 SPECIFICATIONS (Cont'd)

Phase Detector

Input Frequency: The BB frequency is selected automatically.

	K type	L type	M type
f1	66.667 kHz	92.593 kHz	83.333 kHz
f2	200 kHz	277.778 kHz	250 kHz
f3	400 kHz	555.556 kHz	500 kHz
f4	2 MHz	2.4 MHz	
f5	3.58 MHz		
f6	4.43 MHz		
f7	5.6 MHz		
f8	8.2 MHz		
f9	12.39 MHz (ME538K/L/M)		
f10	55.556 kHz [1] (option)		

[1] 27.8 kHz can be supplied if specified.

Capture Range:
±5 Hz ≦555.556 kHz
5×10^{-6} ≦12.39 MHz
*1 ±1 Hz ≦55.5556 kHz

Frequency Markers

Slide Marker: Variable side markers: 70 ±25 MHz, 140 ±50 MHz

Frequency Display: 4-digit LED display
Resolution: 10 kHz

Accuracy: ±1 x 10^{-4} ±1 digit

2 MHz Comb + Slide: 2 MHz Comb
Markers + Variable side markers

Center Frequency Counter

Counts the center frequency of the swept IF signal and displays it on the 5-digit LED display.
The display to the LED display is made by selecting either the slide marker frequency or center frequency with a key.

Frequency Range:
70 MHz band: 45 to 90 MHz
140 MHz band: 90 to 190 MHz

Frequency Display:
4-digit LED display (ME453K/L/M)
5-digit LED display (ME538K/L/M)
Resolution: 10 kHz

Accuracy: ±1 x 10^{-3} ±1 digit

IF Sweep Width Measurement

Measuring Range:
70 MHz band: ±0.2 to ±25 MHz
140 MHz band: ±0.2 to ±50 MHz

Resolution:
0.2 to 9.99 MHz: 10 kHz
10 to 50 MHz: 100 kHz

Accuracy: ±5 x 10^{-2} ±1 digit

BB Output (Rear Panel)

Level: −7 dBm, typical

Impedance: 75 Ω, nominal

Ext. Sweep Input (Rear Panel)

Frequency: 18 Hz to 100 Hz

Level: 1 Vp-p

Impedance: >5 kΩ, nominal

X-Y Recorder Output (Option)

Output:
X: 0 to 4 V
Y: 0 to 4 V
Pen lift: Open
Pen down: Ground

Sweep Speed: 20 sec., 40 sec., nominal

*1 Optional

Table 1-2 SPECIFICATIONS (Cont'd)

Transmitter

IF Output	Frequency Range	70 MHz band: 45 to 95 MHz 140 MHz band: 90 to 190 MHz
	Center Frequency Display	4-digit LED display (ME453K/L/M) 5-digit LED display (ME538K/L/M) Resolution: 10 kHz
	Accuracy	$\pm 1 \times 10^{-4} = \pm 1$ digit/CW
	Stability	±100 kHz at 70 MHz ±200 kHz at 140 MHz 5 hrs after 1/2 hr warm-up
	Level Range	+10 to −70 dBm (1 dB step attenuator) Continuously variable range: >±1 dB
	Level Accuracy	±0.3 dB at +4 dBm
	Harmonics	<−30 dB
	Impedance	75 Ω Return Loss: >30 dB at +4 dBm
IF Sweep Width	Sweep Width Range	70 MHz band: 0 to ±25 MHz 140 MHz band: 0 to ±50 MHz
	Sweep Width Display	3-digit LED display Resolution: 0.1 MHz
	Auto Sweep Reduction	The sweep width is reduced by 2 x BB frequency ±10 % when BB frequency >1 MHz. This function can be reset with a switch.
FM Deviation	Mod frequency	Same as BB frequency (item 6)
	Deviation Range	5 to 1000 kHz rms
	Deviation Display	4-digit LED display Resolution: 1 kHz rms
AUX IF Output	Frequency Range	Same as IF OUTPUT specifications (item 1).
	Output Level	−10 dBm
	Level Accuracy	<±1 dB
	Impedance	75 Ω, nominal
Crystal Output	Frequency	70 MHz band: 70 MHz 140 MHz band: 140 MHz
	Output Level	+5 dBm
	Level Accuracy	<±1 dB
	Impedance	75 Ω, nominal
BB + Sweep Output	BB Frequency	

	K type	L type	M type
f1	66.667 kHz	92.538 kHz	83.333 kHz
f2	200 kHz	277.778 kHz	250 kHz
f3	400 kHz	555.556 kHz	500 kHz
f4	2 MHz	2.4 MHz	
f5	3.58 MHz		
f6	4.43 MHz		
f7	5.6 MHz		
f8	8.2 MHz		
f9	12.39 MHz (ME538K/L/M)		
f10	55.556 kHz [1] (option)		

[1] Can be changed to 27.778 kHz if so specified.
Sweep frequency is automatically set to 18 Hz when f10 is selected.

BB Frequency Accuracy	±5 Hz ≤555.556 kHz $\pm 5 \times 10^{-6}$ ≤12.39 MHz ±1 Hz ≤55.5556 kHz *1

*1 Optional

Table 1-2 SPECIFICATIONS (Cont'd)

(Cont'd) BB + Sweep Output	BB Level	+10 to −50 dBm A 10 dB step attenuator and 0 to −10 dB continuously variable dial are provided for setting the level.
	BB Level Display	3-digit LED display Resolution: 0.1 dB
	BB Level Accuracy	±0.3 dB at 0 dBm
	BB Harmonics	<−38 dB
	BB Impedance	75 Ω Return Loss: >28 dB at −10 dBm
	Sweep Frequency	Line (50/60 Hz), 70 Hz Option (select one frequency from 18 Hz to 100 Hz) Ext. (18 Hz to 100 Hz)
	Sweep Level	0 to 6.5 Vp-p/75 Ω
	Sweep Level Display	3-digit LED display Resolution: 0.01 V
	Sweep Level Accuracy	±10 % at 6 Vp-p
	Sweep Harmonics	<−35 dB
	Sweep Impedance	75 Ω, nominal
Sweep Output	Sweep Level	0 to 25 Vp-p/10 kΩ
	Sweep Level Display	3-digit LED display Resolution: 0.01 x 4 V
	Sweep Level A Accuracy	±10 % at 24 Vp-p
Ext. Sweep Input (Rear panel)	Frequency	18 to 100 Hz
	Level	2 Vp-p
	Impedance	75 Ω, nominal
BB Sweeper (Option)	Frequency Range	60 kHz to 15 MHz
	BB Output Level	+10 dBm to −50 dBm (10 dB step attenuator) Continuously variable range: 0 to −10 dB
	BB Level Display	3-digit LED display Resolution: 0.1 dB
	Inherent slope	±0.5 dB/100 kHz to 13 MHz The value of the sum of the receiver and transmitter.
	Impedance	75 Ω Return Loss: >28 dB at −10 dBm

Table 1-2 SPECIFICATIONS (Cont'd)

Low BB frequency (55.6 kHz or 27.8 kHz) specification (Option)

Group Delay	Inherent Slope	70 ±10 MHz: 5 ns 140 ±10 MHz: 5 ns
	Measuring Range	0 to 400 ns
	Max. Sensitivity	2 ns/div.
	Noise	1 ns, *1
Linearity	Inherent Slope	70 ±10 MHz: 0.5 % 140 ±10 MHz: 0.5 %
	Measuring Range	0 to 80 %
	Max. Sensitivity	0.1 % div.
	Noise	0.1 %*

* With deviation 100 kHz rms using average function.

General Specifications

Input and Output Connector	BNC or SP connector Other type of connector can be installed if requested by the user: e.g.,WECO560A or equivalent
Power Supply	260 VA Transmitter: 85 VA Receiver: 175 VA Voltages are available from 100 V AC to 254 V AC, at the request of the user. Tolerance ±10 %
Ambient temperature (Rated range of use)	0° to 50°C
Dimensions and Weight	Receiver: 177H x 426W x 450D(mm), ≤18.5 kg Transmitter: 133H x 426W x 450D(mm), ≤13.5 kg

SECTION 2

PERFORMANCE CHECKS

2.1 INTRODUCTION

The TEST INSTRUMENT is calibrated according to Table 2-1 to 2-3.

The TEST PERFORMANCE SHEET is prepared in paragraph 2.5.

Environmental range at which specifications apply:
Temperature 0°C to +50°C Relative humidity 95% (50°C)

Table 2-1 Calibration Description of Transmitter

TEST INSTRUMENT CHARACTERISTICS	PERFORMANCE SPECIFICATIONS	TEST METHOD
(1) IF OUTPUT LEVEL	Accuracy: ±0.3 dB (+4 dBm)/ 70 MHz, 140 MHz	The IF output level is measured by using a Standard Level Meter
(2) IF CENTER FREQUENCY	Accuracy: ±20 kHz/70 MHz, 140 MHz	The IF center frequency is measured by using a Frequency Counter
(3) IF SWEEP WIDTH	Accuracy: ±(displayed value x 3%) ±0.5 MHz	The IF sweep width is measured by using a MSA Receiver
(4) FM DEVIATION	Accuracy: 10% at built-in BB frequency ≦8.2 MHz	The FM deviation is measured by using a MSA Receiver
(5) BB OUTPUT LEVEL	Accuracy: ±0.3 dB (0 dBm), F1[*1] to 12.39 MHz	The BB output level is measured by using Standard Level Meter
(6) BB FREQUENCY	Accuracy: F1, F2, F3[*1] - ±5 Hz, F4 to 12.39 MHz - ±5 x 10^{-6}	The BB frequency is measured by using Frequency Counter
(7) SWEEP OUTPUT (BB + SWEEP OUTPUT TERMINAL)	Level range: 0 to ≧6.5 Vp-p (75 Ω) Accuracy: ±10% (6 Vp-p)	The sweep output level is measured by using Oscilloscope and 75 Ω Terminator

Table 2-1 Calibration Description of Transmitter (Cont'd)

TEST INSTRUMENT CHARACTERISTICS	PERFORMANCE SPECIFICATIONS	TEST METHOD
(8) SWEEP OUTPUT (SWEEP OUTPUT TERMINAL)	Level range: 0 to ≥25 Vp-p (10 kΩ) Accuracy: ±10% (24 Vp-p)	The sweep output level is measured by using Oscilloscope and 10 kΩ Terminator
(9) AUX IF OUTPUT	Accuracy: -10 dBm ±1 dB/ 70 MHz, 140 MHz	The output level is measured by using Level Meter
(10) CRYSTAL OUTPUT	Accuracy: +5 dBm ±1 dB/ 70 MHz, 140 MHz	

*1	Microwave System Analyzer		
	K type	L type	M type
F1	66.667 kHz	92.593 kHz	83.333 kHz
F2	200 kHz	277.778 kHz	250 kHz
F3	400 kHz	555.556 kHz	500 kHz
F4	2 MHz	2.4 MHz	

Table 2-2 Calibration Description of Receiver

TEST INSTRUMENT CHARACTERISTICS	PERFORMANCE SPECIFICATIONS	TEST METHOD
(1) IF INPUT LEVEL	Accuracy: ±0.3 dB (+4 dBm), 70 MHz, 140 MHz	The input levels are measured by using MSA Transmitter and Standard Level Meter
(2) BB INPUT LEVEL	Accuracy: ±0.3 dB (0 dBm)	
(3) FM DEVIATION	Accuracy: ±10% at built-in BB frequency ≤8.2 MHz	The FM deviation is measured by using MSA Transmitter
(4) FREQUENCY MARKER	Center Marker accuracy: ±100 kHz/70 MHz ±200 kHz/140 MHz	The frequency marker accuracy is measured by using Synthesized Oscillator and MSA Transmitter
(5) X-Y RECORDER OUTPUT (Optional)	X : DC 0 to ≥ +4 V Y : DC 0 to ≥ +4 V	The X-Y recorder output is measured by using an Oscilloscope
(6) PHASE DETECTION CAPTURE RANGE	±5 Hz ≤ 555.556 kHz 5×10^{-6} ≤ 12.39 MHz	The phase detection capture range is measured by using a Synthesized Oscillator
(7) DC INPUT	Range: 0 to ±400 mV Accuracy: ±5%	The dc input is measured by using a Standard DC Voltage Generator

Table 2-3 Calibration Description of Measurements

TEST INSTRUMENT CHARACTERISTICS	PERFORMANCE SPECIFICATIONS	TEST METHOD
(1) IF TO IF BAND		
(i) AMPLITUDE	70 MHz Band ±0.05 dB/±25 MHz	These characteristic items are measured back to back of the MSA.
	140 MHz Band ±0.05 dB/±25 MHz ±0.1 dB/±40 MHz ±0.2 dB/±50 MHz	
(ii) GROUP DELAY	70 MHz Band 0.3 ns/±15 MHz 0.5 ns/±25 MHz	
	140 MHz Band 0.3 ns/±20 MHz 0.5 ns/±30 MHz 1.0 ns/±50 MHz	
(iii) LINEARITY	70 MHz Band 0.2%/±25 MHz	
	140 MHz Band 0.2%/±50 MHz	
(iv) DIFFERENTIAL PHASE	70 MHz Band 0.3°/±15 MHz 0.5°/±25 MHz	
	140 MHz Band 0.3°/±20 MHz 0.5°/±30 MHz 0.8°/±50 MHz	Sweep width = Carrier sweep width + 2fM
(v) DIFFERENTIAL GAIN	70 MHz Band 0.2%/±15 MHz 0.4%/±25 MHz	
	140 MHz Band 0.3%/±20 MHz 0.4%/±30 MHz 0.6%/±50 MHz	
(2) BB TO BB		These characteristics are measured back to back of the MSA.
(i) GROUP DELAY	Accuracy: ±5% at 10 ns	
(ii) LINEARITY	Accuracy: ±10% at 10%	
(iii) DIFFERENTIAL PHASE	Accuracy: ±5% at 1°	
(iv) DIFFERENTIAL GAIN	Accuracy: ±10% at 10%	
(3) IF RETURN LOSS	Inherent slope: ±1 dB/70±25 MHz, -30 dBm ±1 dB/140±50 MHz, -30 dBm	
(4) AM TO PM CONVERSION	Residual PM: 0.3°/dB 70±25 MHz, 140±35 MHz	
(5) BB AMPLITUDE (Optional)	Inherent slope: ±0.5 dB/100 kHz to 13 MHz, 0 dBm	

2.2 EQUIPMENT REQUIREMENTS

Note:

Minimum use specifications are the principal parameters required for performance of the calibration, and are included to assist in the selection of alternate equipment. Satisfactory performance of alternate items should be verified prior to use. All applicable equipment must bear evidence of current calibration.

Table 2-4 Equipment Requirements

Item	Generic Term	Minimum Use Specifications	Recommended Model
T2.1	STANDARD LEVEL METER	(1) Frequency range : 10 kHz to 200 MHz or more (2) Level measurement range : -10 dBm to +6 dBm (3) Level measurement accuracy : Within ±0.1 dB (4) Input impedance : 75 Ω	ML59B
T2.2	LEVEL METER	(1) Frequency range : 300 kHz to 200 MHz or more (2) Level measurement range : -60 dBm to +20 dBm (3) Level measurement accuracy : ±0.3 dB (4) Input impedance : 75 Ω	ML58B
T2.3	FREQUENCY COUNTER	(1) Measuring frequency range: 10 kHz to 1 GHz (2) Input level range : -15 dBm (3) Measuring frequency resolution: 1 kHz	MF76A

Table 2-4 Equipment Requirements (Cont'd)

Item	Generic Term	Minimum Use Specification	Recommended Model
T2.6	OSCILLOSCOPE	(1) Frequency range : dc to 30 MHz (2) Input level range : 5 mV/div to 10 V/div	-
T2.10	SYNTHESIZER	(1) Frequency range : 10 kHz to 200 MHz (2) Output Level : 0 dBm (3) Output Impedance : 75 Ω	MG545A
T2.11	STANDARD DC VOLTAGE GENERATOR	(1) Output Range : 0 to ±1.00 V	-

2.3 PRELIMINARY OPERATION

(1) Turn on the power of the TEST INSTRUMENT.

(2) This calibration should be performed after a warm up period of 30 minutes or more.

2.4 CALIBRATION PROCEDURE

Note:

Unless otherwise specified, verify the results of each test and take corrective action whenever the test requirement is not met.

2.4.1 Transmitter

(1) IF Output Level

(a) Specifications

Level accuracy: ±0.3 dB at +4 dBm

(b) Setup

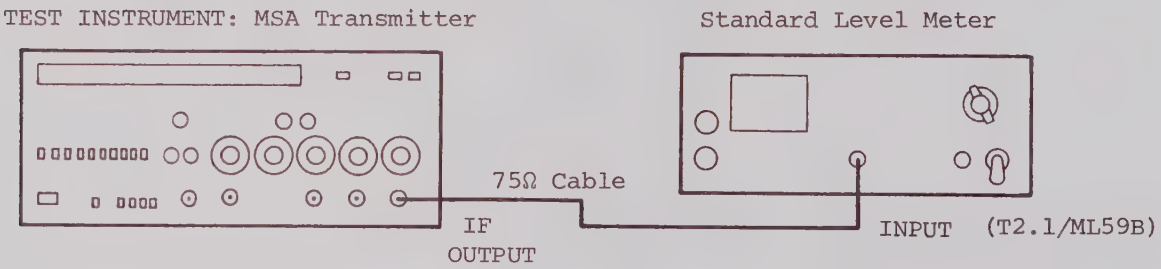


Fig. 2-1 IF Output Level Test

(c) Procedures

(i) Connect the MSA IF OUTPUT to the Standard Level Meter.

(ii) Set the controls as shown below.

TRANSMITTER:

①	TRANSMITTER MODE	
	IF BAND	70 MHz or 140 MHz
	BB, IF	IF
②	IF OUTPUT LEVEL dBm	+4 dBm
③	IF CENTER FREQ MHz	70 MHz or 140 MHz
④	SWEEP FREQUENCY	LINE
⑤	SWEEP WIDTH ±MHz	0 MHz
⑥	SWEEP REDUCTION	OFF
⑦	BB FREQUENCY Hz	200 kHz, 278 kHz or 250 kHz
⑧	DEVIATION kHz rms	200 kHz rms

(iii) Read the Standard Level Meter indication

(iv) Verify that the level is within +4 dBm ±0.3 dB

(2) IF Center Frequency

(a) Specifications

IF Center Frequency accuracy

70 MHz: ±10 kHz ±1 digit

140 MHz: ±20 kHz ±1 digit

(b) Setup

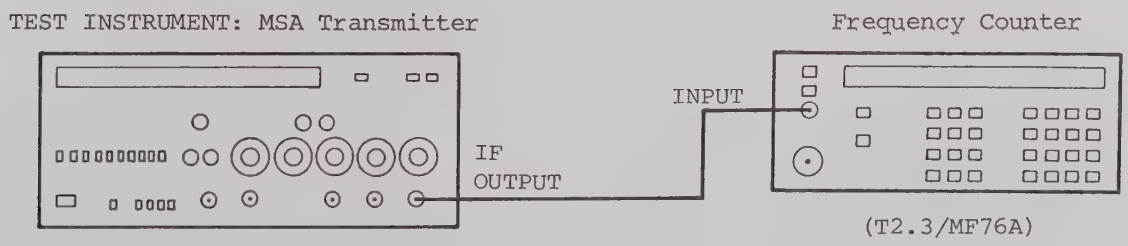


Fig. 2-2 IF Center Frequency

(c) Procedures

(i) Connect the MSA IF OUTPUT to the Frequency counter.

(ii) Set the controls as shown below.

TRANSMITTER:

①	TRANSMITTER MODE	
	IF BAND	Required IF band.
	BB, IF	IF.
②	IF CENTER FREQ	70.00 MHz or 140.00 MHz
③	SWEEP FREQUENCY	LINE.
④	SWEEP WIDTH ±MHz	0 MHz.
⑤	SWEEP REDUCTION	OFF.
⑥	BB FREQUENCY Hz	F2.
⑦	DEVIATION kHz rms	0 kHz rms.
⑧	IF OUTPUT LEVEL dBm	Level specified by application.

(iii) Set Resolution Band of the frequency counter to 100 Hz.

(iv) Verify that the display error is within the following values:

70 MHz: Within ±10 kHz ±1 digit (±20 kHz)
140 MHz: Within ±20 kHz ±1 digit (±30 kHz)

(3) IF Sweep Width

(a) Specifications

Sweep width accuracy: ±(displayed value x 3%)
±0.5 MHz

(b) Setup

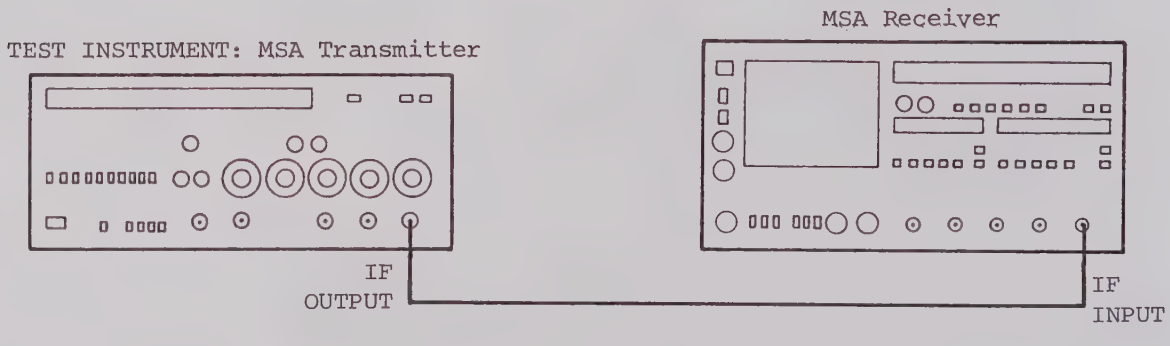


Fig. 2-3 IF Sweep Width

(c) Procedures

(i) Connect the IF OUTPUT to the IF Input.

(ii) Set the controls as shown below.

TRANSMITTER:		
①	TRANSMITTER MODE IF BAND BB, IF	 Required IF band. IF.
②	IF CENTER FREQ	70 MHz or 140 MHz
③	SWEEP FREQUENCY	LINE.
④	SWEEP WIDTH ±MHz	70 MHz band ±10 MHz, ±25 MHz 140 MHz band ±10 MHz, ±50 MHz
⑤	SWEEP REDUCTION	Push ON if the automatic sweep reduction function is required.
⑥	BB FREQUENCY Hz	F2.
⑦	DEVIATION kHz rms	200 kHz rms.
⑧	IF OUTPUT LEVEL dBm	Level specified by application.
RECEIVER:		
⑨	RECEIVER MODE IF BAND BB, IF	 70 MHz or 140 MHz. IF.
⑩	RANGE	AUTO.
⑪	FREQ SELECT	MARKER. Set the frequency to observing band width.
⑫	X SELECT	IF.
⑬	X PHASE, BLANKING	Adjust the knob to coincide the tracing marker pulse with the retracing marker pulse while the BLANKING switch is OFF. After adjusting, set the BLANKING switch to ON.

(iii) Adjust the marker frequency knob of the MSA receiver to obtain the CRT image shown in Fig. 4-4.

Fig. 2-4 Marker Image on CRT

(4) Read slide marker display on the Receiver at this time.

(5) Verify that the display is the value shown below.

±0.8 MHz/70 M ±10 MHz
±1.25 MHz/70 M ±20 MHz
±0.8 MHz/140 M ±10 MHz
±2.0 MHz/140 M ±50 MHz

(4) FM Deviation

(a) Specifications

Accuracy: 10% at built-in BB frequency ≦8.2 MHz

(b) Setup

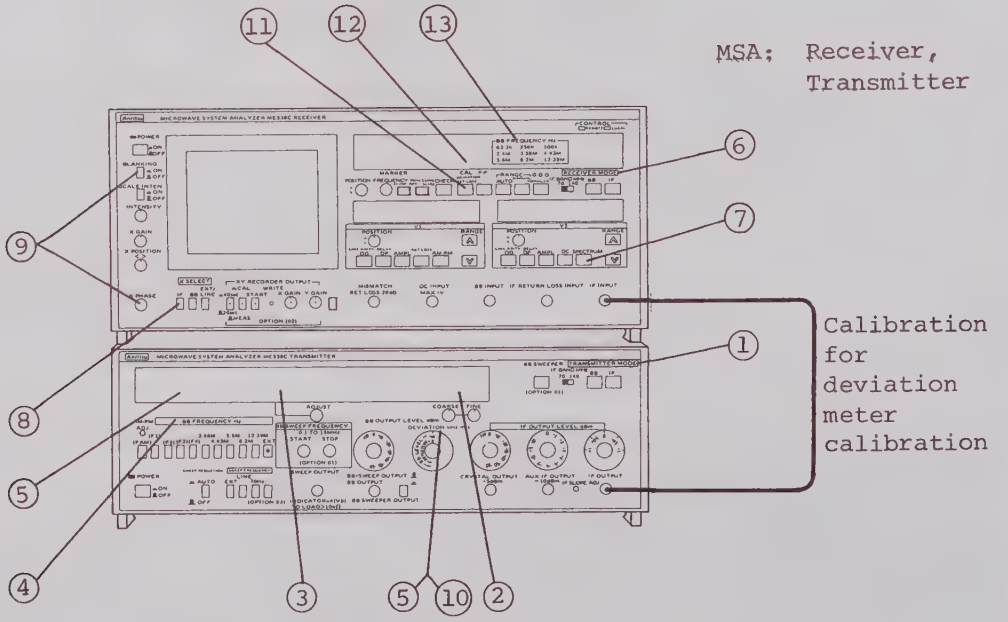


Fig. 2-5 FM Deviation

(C) Procedures

(i) Connect the IF OUTPUT to the IF Input.

(ii) Set the controls as shown below.

TRANSMITTER:		
①	TRANSMITTER MODE	
	IF BAND	70 MHz or 140 MHz
	BB, IF	IF.
②	IF CENTER FREQ	70 MHz or 140 MHz.
③	SWEEP WIDTH ±MHz	Zero.
④	BB FREQUENCY	K type-200 kHz, L type-278 kHz, M type-250 kHz.
⑤	DEVIATION kHz rms	Set the deviation to K type-340 kHz rms, L type-472 kHz rms and M type-425 kHz rms.
RECEIVER:		
⑥	RECEIVER MODE	
	IF BAND	Same as Transmitter.
	BB, IF	IF.
⑦	Y2 keys	SPECTRUM.
⑧	X SELECT	IF.
⑨	X PHASE, BLANKING	Adjust the knob to make the trasing spectrum image coincide with the re-tracing spectrum image when the BLANKING switch is OFF.
⑩	DEVIATION dial of TRANSMITTER	Readjust the DEVIATION kHz rms dial of the TRANSMITTER to get the first carrier zero spectrum on the CRT screen.

(iii) Read the transmitter deviation display at first carrier zero.

(iv) Verify that the transmitter deviation display is the value shown below.

Model	Specifications
K type	340 kHz rms ±10%
L type	472 kHz rms ±10%
M type	425 kHz rms ±10%

(5) BB Output Level

(a) Specifications

Level Accuracy: ±0.3 dB (0 dBm)

(b) Setup

Fig. 2-6 BB Output Level

(c) Procedures

(i) Connect the MSA BB OUTPUT to the INPUT of the Standard Level Meter.

(ii) Set the controls as shown below.

TRANSMITTER:

①	TRANSMITTER MODE	BB.
②	(OUTPUT SELECT)	BB OUTPUT ▬
③	BB OUTPUT LEVEL dBm	0 dBm.
④	SWEEP OUTPUT	Zero.
⑤	BB FREQUENCY	F1 to 12.38 MHz

(iii) Read the Standard Level Meter indication.

(iv) Verify that the indication is within 0 dBm ±0.3 dB.

(6) BB Frequency

(a) Specifications

BB FREQUENCY: Low freq.: K type-66.666, 200 and 400 kHz, L type-92.593, 277.778, 555,556 kHz, M type-83.333, 250, 500 kHz.
High frea.: 2 (type K), 2.4 (L, M type), 3.58, 4.43, 5.6, 8.2 MHz 12.39 MHz (ME538K/L/M).
Accuracy: Low freq. - ±5 Hz,
High freq. - ±5 x 10^{-6}.

(b) Setup

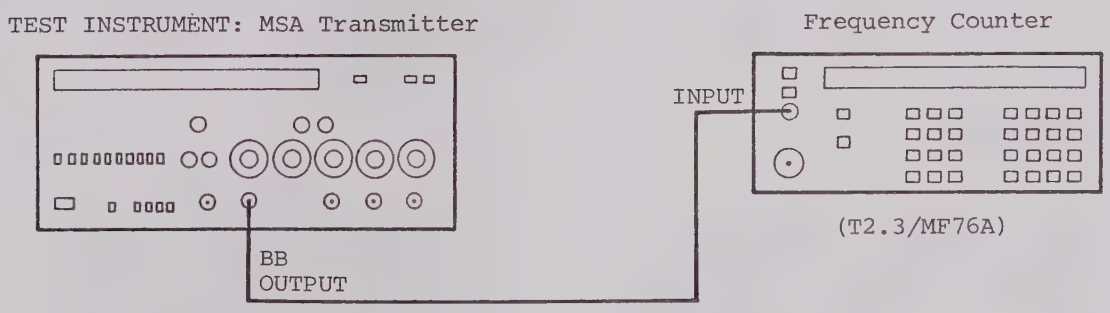


Fig. 2-7 BB Frequency

(c) Procedures

(i) Connect the MSA BB OUTPUT to the Input of the Frequency Counter.

(ii) Set the resolution SW to 1 Hz of the Frequency Counter.

(iii) Set the controls as shown below.

TRANSMITTER:

①	TRANSMITTER MODE	BB.
②	(OUTPUT SELECT)	BB OUTPUT ▬
③	BB OUTPUT LEVEL dBm	0 dBm.
④	SWEEP OUTPUT	Zero.
⑤	BB FREQUENCY	F1 to 12.38 MHz.

(iv) Read the frequency counter display.

(v) Verify that the display satisfies the specifications of section 2.4.1 (6), (a).

(7) Sweep Output (BB + Sweep Output terminal)

(a) Specification

Level Range: 0 to ≥ 6.5 Vp-p (75 Ω)
Level Accuracy: ±10% (6 Vp-p)

(b) Setup

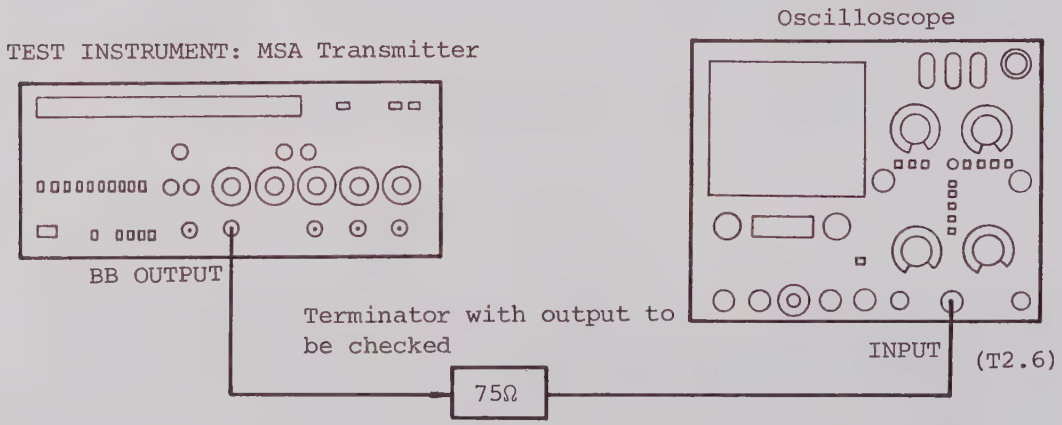


Fig. 2-8 Sweep Output (BB + Sweep Output terminal)

(c) Procedures

(i) Connect the MSA BB OUTPUT to the INPUT of the Oscilloscope via 75 Ω Terminator.

(ii) Set the controls as shown below.

TRANSMITTER:

①	TRANSMITTER MODE	BB.
②	(OUTPUT SELECT)	BB + SWEEP OUTPUT
③	BB OUTPUT LEVEL dBm	-50 dBm.
④	SWEEP FREQUENCY	LINE or 70 Hz.
⑤	BB SWEEP OUTPUT	3.00 Vp-p/75 Ω (Set the ADJUST knob).

(iii) Read the voltage of the waveform displayed on the oscilloscope.

(iv) Verify that this voltage is within 6 Vp-p ±10%.

(v) Vary the level from minimum to maximum with the SWEEP OUTPUT ADJUST knob. Read its value on the oscilloscope used.

(vi) Verify that the voltage is 0 to ≥ 6.5 Vp-p.

(8) Sweep Output (Sweep Output terminal)

(a) Specification

Level range: 0 to 25 Vp-p or greater/10 kΩ
Level Accuracy: ±10% (24 Vp-p)

(b) Setup

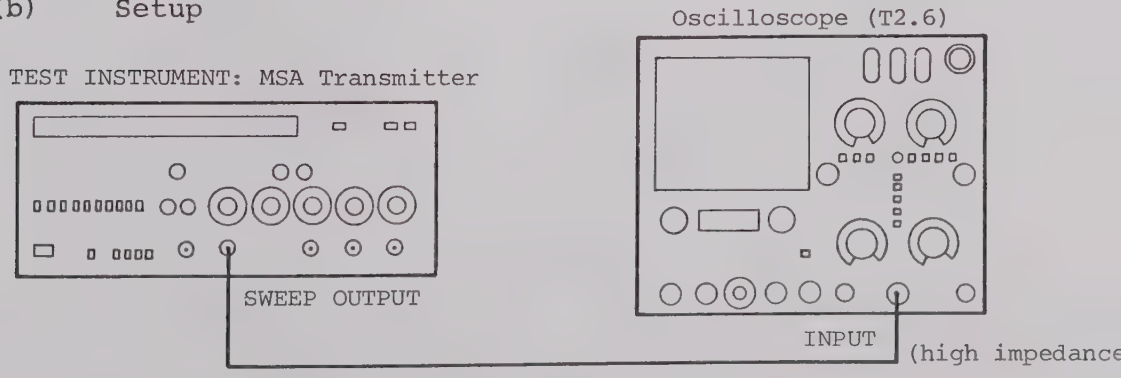


Fig. 2-9 Sweep Output (Sweep Output terminal)

(c) Procedures

(i) Connect the MSA SWEEP OUTPUT to the Input of the Oscilloscope.

(ii) Set the controls as shown below.

TRANSMITTER:

①	TRANSMITTER MODE	BB.
②	(OUTPUT SELECT)	BB + SWEEP OUTPUT ▙
③	BB OUTPUT LEVEL dBm	0 dBm.
④	SWEEP FREQUENCY	LINE or 70 Hz.
⑤	BB SWEEP OUTPUT	3.12 Vp-p (75 Ω)

(iii) Read the voltage of the waveform displayed on the oscilloscope.

(iv) Verify that this voltage is within 24 Vp-p ±10%.

(v) Vary the level from minimum to maximum with the SWEEP OUTPUT ADJUST knob. Read its value on the oscilloscope used.

(vi) Verify that the voltage is 0 to ≥ 25 Vp-p.

(9) AUX IF Output

(a) Specification

Level Accuracy: -10 dBm ±1 dB

(b) Setup

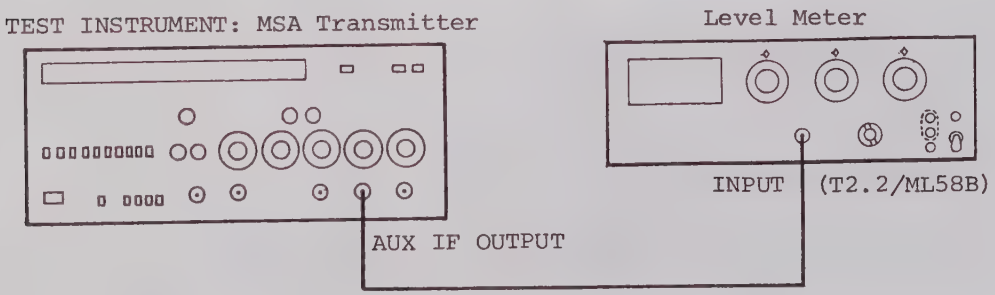


Fig. 2-10 AUX IF Output

(c) Procedures

(i) Connect the MSA AUX IF OUTPUT to the Input of the Level Meter.

(ii) Set the controls as shown below.

TRANSMITTER:

①	TRANSMITTER MODE	
	IF BAND	70 MHz or 140 MHz
	BB, IF	IF.
②	IF CENTER FREQ	70 MHz or 140 MHz.
③	SWEEP FREQUENCY	LINE.
④	SWEEP WIDTH ±MHz	0 MHz.
⑤	DEVIATION kHz rms	Set to 200 kHz rms.
⑥	IF OUTUT LEVEL dBm	Required level (-20 dBm to +10 dBm). (Set Variable Attenuator to 0).

(iii) Read the Level Meter indication.

(iv) Verify that level is within -10 dBm ±1 dB

(10) CRYSTAL Output

(a) Specification

Level Accuracy: +5 dBm ±1 dB

(b) Setup

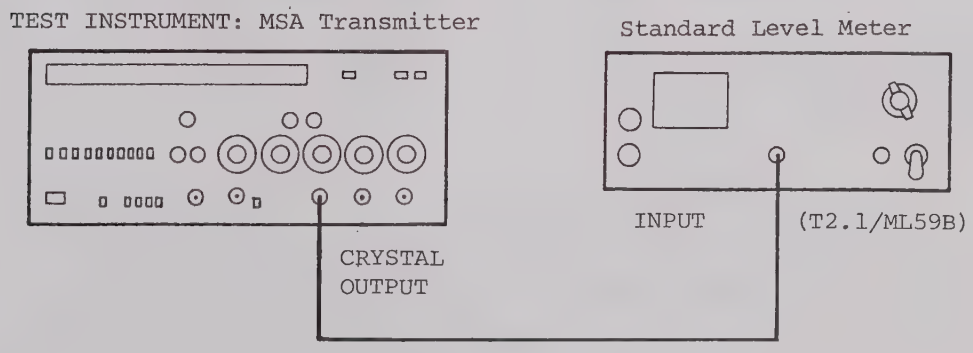


Fig. 2-11 Crystal Output

(c) Procedures

(i) Connect the MSA CRYSTAL OUTPUT to the Input of the Level Meter.

(ii) Set the controls as shown below.

TRANSMITTER:

①	TRANSMITTER MODE IF BAND BB, IF	Required IF band. IF.
②	IF CENTER FREQ	70 MHz or 140 MHz.

(iii) Read the Level Meter indication.

(iv) Verify that level is within +5 dBm ±1 dB.

2.4.2 Receiver

(1) IF Input Level

(a) Specifications

Level accuracy: ±0.3 dB/+4 dBm, 70 MHz or 140 MHz.

(b) Setup

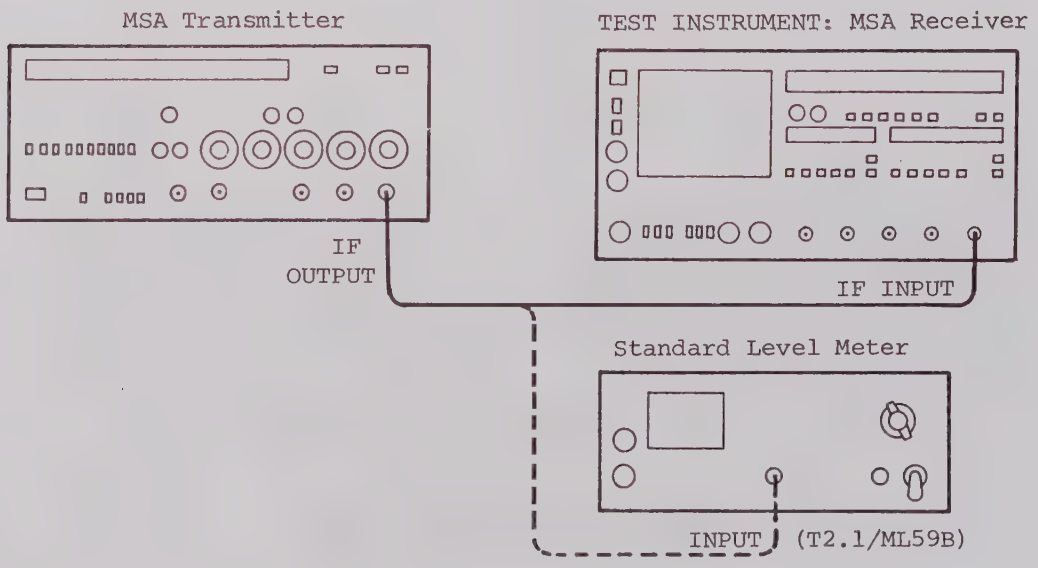


Fig. 2-12 IF Input Level Test

(c) Procedures

(i) Set the controls of the MSA Transmitter as shown below.

①	TRANSMITTER MODE	
	IF BAND	70 MHz or 140 MHz
	BB, IF	IF.
②	IF CENTER FREQ	70 MHz or 140 MHz
③	SWEEP FREQUENCY	LINE.
④	SWEEP WIDTH ±MHz	Zero.
⑤	SWEEP REDUCTION	ON.
⑥	BB FREQUENCY Hz	F2.
⑦	DEVIATION kHz rms	Zero.
⑧	IF OUTPUT LEVEL dBm	+4 dBm.

(ii) Connect the IF OUTPUT of the Transmitter to the Input of the Standard Level Meter.

(iii) Set IF OUTPUT LEVEL of the transmitter to obtain a standard level meter indication of +4 dBm.

(iv) Connect the IF OUTPUT of the MSA Transmitter to the IF INPUT of the MSA Receiver.

(v) Set the controls of the MSA Receiver as shown below.

①	RECEIVER MODE	Same as Transmitter Mode.
	IF BAND	
	BB, IF	IF.

(vi) Read the IF INPUT LEVEL of the MSA Receiver.

(vii) Verify that IF INPUT LEVEL is within +4 dBm ±0.3 dB/70 MHz or 140 MHz.

(2) BB Input Level

(a) Specifications

Level accuracy: ±0.3 dB/0 dBm

(b) Setup

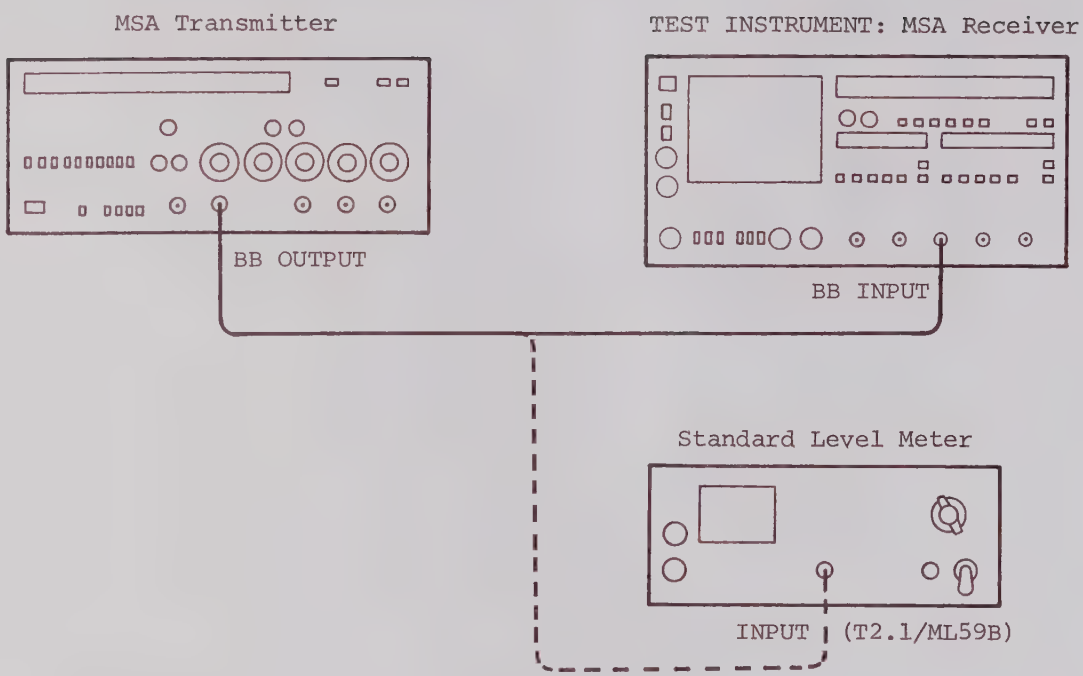


Fig. 2-13 BB Input Level Test

(c) Procedures

(i) Set the controls of the MSA Transmitter as shown below.

①	TRANSMITTER MODE	BB.
	(OUTPUT SELECT)	BB OUTPUT ▬
②	BB OUTPUT LEVEL dBm	0 dBm.
③	SWEEP OUTPUT	Zero.
④	BB FREQUENCY	F1.

(ii) Connect the BB OUTPUT of the Transmitter to the Input of the Standard Level Meter.

(iii) Set BB OUTPUT LEVEL of the transmitter to obtain a standard level meter indication of 0 dBm.

(b) Setup

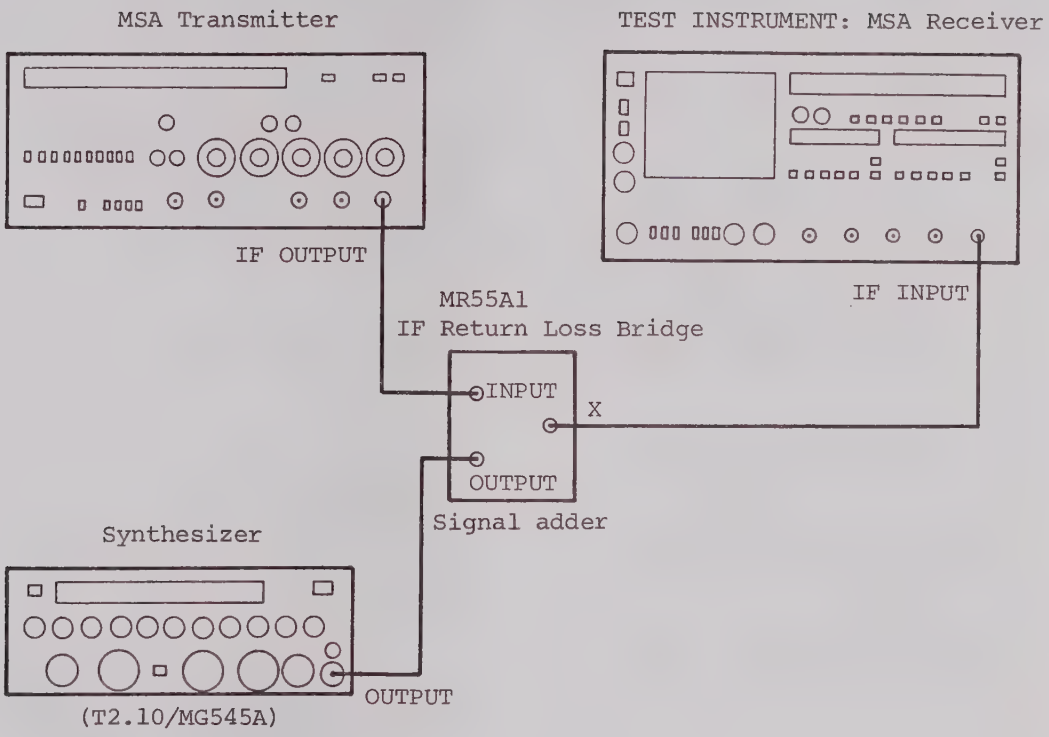


Fig. 2-15 Frequency Marker Test

(c) Procedures

(i) Connect the Transmitter IF OUTPUT to Input port of the IF Return Loss Bridge.

(ii) Connect the Snythesizer Output to Output port of the IF Return Loss Bridge.

(iii) Connect the IF Return Loss Bridge X port to the IF INPUT of MSA Receiver.

(iv) Set the controls as shown below.

TRANSMITTER:		
①	TRANSMITTER MODE	
	IF BAND	70 MHz, 140 MHz
	BB, IF	IF.
②	IF CENTER FREQ	70 MHz or 140 MHz
③	SWEEP FREQUENCY	LINE.
④	SWEEP WIDTH ±MHz	±1 MHz.
⑤	SWEEP REDUCTION	OFF.
⑥	BB FREQUENCY Hz	F2.
⑦	DEVIATION kHz rms	200 kHz rms.
⑧	IF OUTPUT LEVEL dBm	0 dBm.
RECEIVER:		
⑨	RECEIVER MODE	
	IF BAND	70 MHz or 140 MHz
	BB, IF	IF.
⑩	RANGE	MANUAL.
⑪	FREQ SELECT	MARKER. Set the frequency to observing band width.
⑫	X SELECT	IF.
⑬	X PHASE, BLANDING	Adjust the knob to coincide the tracing marker pulse with the retracing marker pulse while the BLANKING switch is OFF. After adjusting, set the BLANKING switch to ON.
⑭	Measurements	Y1: LINEARITY, Range 1.0%/DIV. Y2: OFF.

(v) Set the synthesizer output level to -40 dBm.

(vi) Set the synthesizer frequency so that the center of the marker and the beat waveform of the Linearity trace match as shown below.

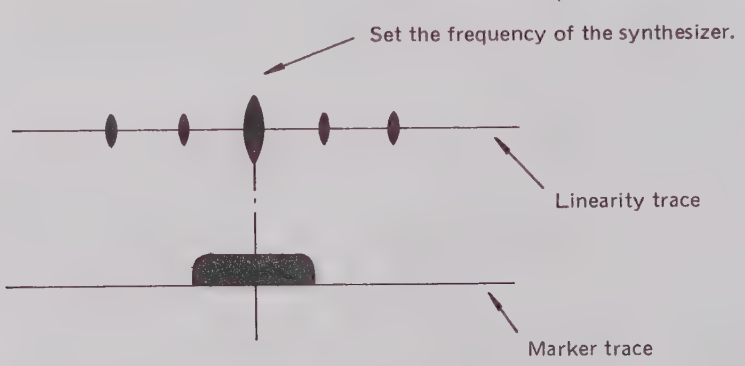


Fig. 2-26 The CRT trace

(vii) Read the frequency on the synthesizer used.

(viii) Verify that its value is ±100 kHz/70 MHz, ±200 kHz/140 kHz.

(5) X-Y Recorder

(a) Specifications

Output Level: X-axis DC 0 to +4 V,
Y-axis DC 0 to +4 V

Pen lift : up ... high down ... ground

(b) Setup

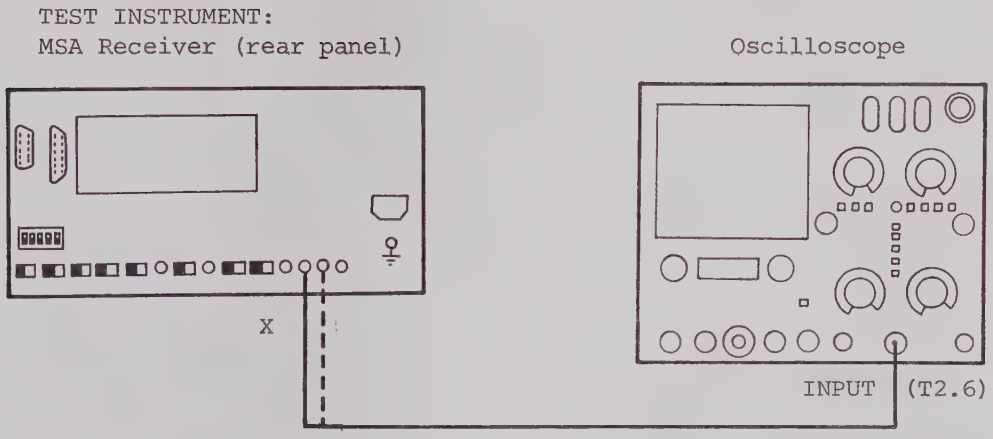
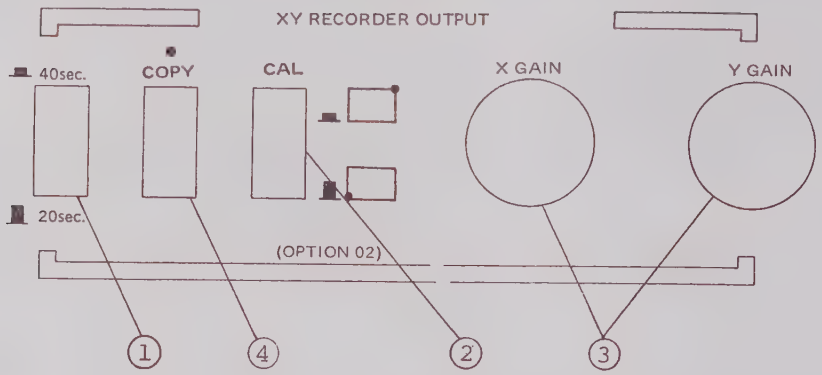


Fig. 2-17 X-Y Recorder Test

(c) Procedures

(i) Set the controls as shown below:



① 40 sec, 20 sec: Pen speed selector.
Set to required speed.

② CAL : Calibration

③ X, Y gain: Adjust to the minimum level and maximum level.

④ COPY

(ii) Connect the X Output or Y Output of the Receiver to the Oscilloscope Input.

(iii) Read the minimum value and maximum value of the image on the oscilloscope.

(iv) Verify that its voltage is 0 to $\geq$ +4 V.

(6) Phase Detection Capture Range

(a) Specification

Capture Range: ± 5 Hz $\leq$ 555.556 kHz
$\pm 5 \times 10^{-6} \leq$ 12.39 MHz

(iv) Connect the BB OUTPUT of the MSA Transmitter to the BB INPUT of the MSA Receiver.

(v) Set the controls of the MSA Receiver as shown below.

①	RECEIVER MODE	BB.
②	BB LEVEL dBm	Read the level.

(vi) Read the BB INPUT LEVEL of the MSA Receiver.

(vii) Verify that BB INPUT LEVEL is within 0 dBm ±0.3 dB.

(viii) Change the transmitter BB frequency from F1 to 12.39 MHz and repeat the measurements of steps (2) to (7).

(3) FM Deviation

(a) Specifications

Accuracy: 10% at the built-in BB frequencies ≤ 8.2 MHz

(b) Setup

MSA: Receiver, Transmitter

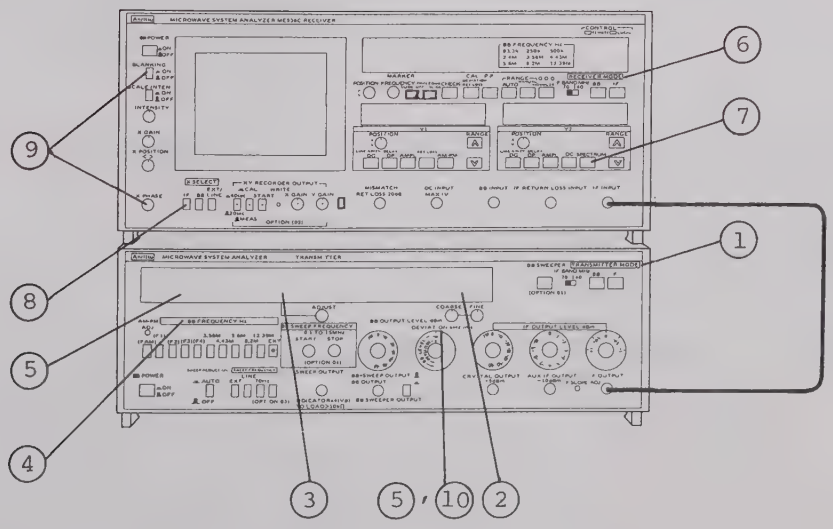


Fig. 2-14 FM Deviation Test

(c) Procedures

(i) Connect the IF OUTPUT of the MSA Transmitter to the IF INPUT of the MSA Receiver.

(ii) Set the controls as shown below.

TRANSMITTER:		
①	TRANSMITTER MODE	
	IF BAND	70 MHz or 140 MHz.
	BB, IF	IF.
②	IF CENTER FREQ	70 MHz or 140 MHz.
③	SWEEP WIDTH ±MHz	Zero.
④	BB FREQUENCY	A type-200 kHz, B type-278 kHz, C type-250 kHz.
⑤	DEVIATION kHz rms	Set the deviation to A type-340 kHz rms, B type-472 kHz rms and C type-425 kHz rms.
RECEIVER:		
⑥	RECEIVER MODE	
	IF BAND	Same as Transmitter.
	BB, IF	IF.
⑦	Y2 keys	SPECTRUM.
⑧	X SELECT	IF.
⑨	X PHASE, BLANKING	Adjust the knob to make the trasing spectrum image coincide with the re-tracing spectrum image when the BLANKING switch is OFF.
⑩	DEVIATION dial of TRANSMITTER	Readjust the DEVIATION kHz rms dial of the TRANSMITTER to get the first carrier zero spectrum on the CRT screen.

(iii) Read the FM Deviation of the Transmitter.

(iv) Verify that FM Deviation accuracy is within ±10%.

(4) Frequency Marker

(a) Specifications

Center Marker Accuracy: ±100 kHz/70 MHz,
±200 kHz/140 MHz

(b) Setup

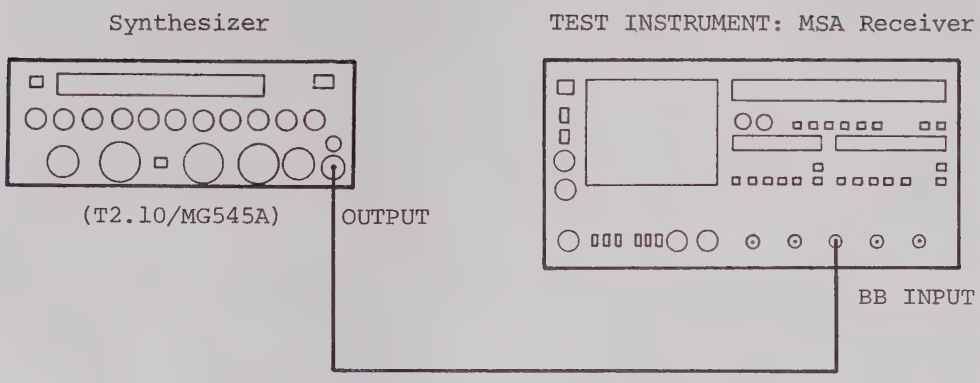


Fig. 2-18 Phase Detection Capture Range Test

(c) Procedures

(i) Set the Receiver of the MSA as shown below.

①	RECEIVER MODE	BB.
②	RANGE	AUTO.
③	MARKER	OFF.
④	X SELECT	LINE.
⑤	Y1	DELAY/DP
⑥	Y2	OFF.
⑦	CAL	ON.

(ii) Set the Snythesizer as shown below.

①	OUTPUT LEVEL	0 dBm.
②	FREQUENCY	Set in accordance with Table 2-5.

(iii) Connect the Output of the Synthesizer to the BB INPUT of the MSA.

(iv) Verify that the BB FREQUENCY LED display of the MSA receiver lights and that two calibration traces (10 ns < 555.556 kHz, 1° < 12.39 MHz) are displayed on the CRT. The phase capture operation can be verified with this check.

Table 2-5 Phase Detection Capture Range

Specification	K type	L type	M type	Note
±5 Hz	66.667 kHz	92.593 kHz	83.333 kHz	F1
	200.000 kHz	277.778 kHz	250.000 kHz	F2
	400.000 kHz	555.556 kHz	500.000 kHz	F3
$\pm 5 \times 10^{-6}$	2 MHz	2.4 MHz		F4
	3.58 MHz			
	4.43 MHz			
	5.6 MHz			
	8.2 MHz			
	12.39 MHz			

(7) DC Input

(a) Specifications

Range: 0 to ±400 mV

Accuracy: ±5%

(b) Setup

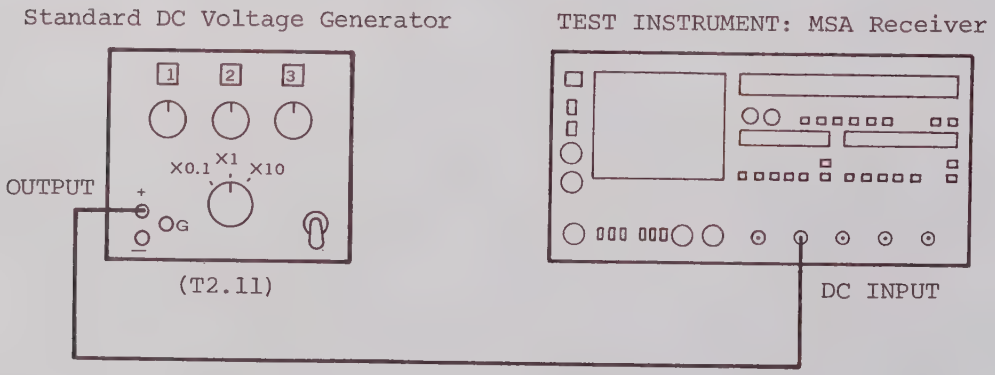


Fig. 2-19 DC Input Test

(c) Procedures

(i) Connect the Standard DC Voltage Generator Output to the DC INPUT of the MSA.

(ii) Push Y2 key to DC

(iii) Set at range 1 mV/DIV using the range key.

(iv) Set the CRT image of the receiver to the center at input 0 V.

(v) Adjust the voltage of the standard DC voltage generator so that the 2 lines on the CRT are on the -4 cm and +4 cm lines.

(vi) Read the voltage of the standard DC voltage generator.

(vii) Verify that the voltage is within ±5%.

(viii) Change the range from 1 mV/DIV to 100 mV/DIV and repeat the measurements of steps (iv) to (vii).

2.4.3 Measurements

(1) Premilinary Operation

Before performing measurements calibration set the MSA rear panel switches as shown below.

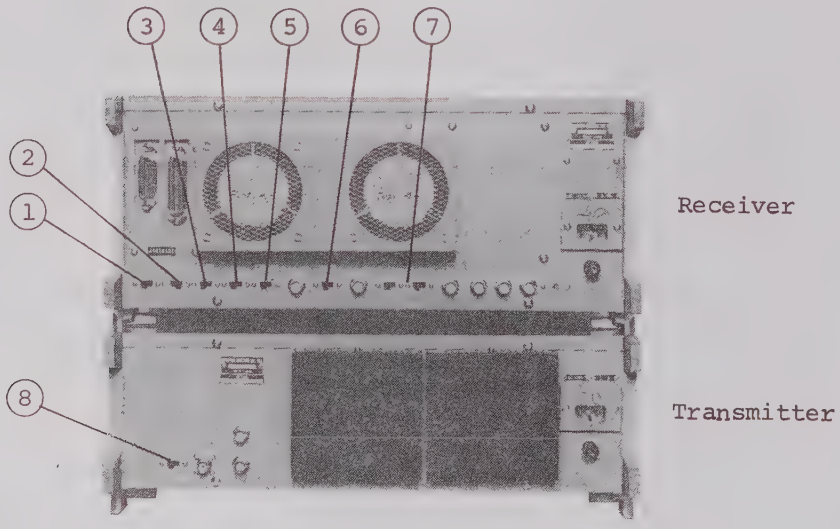


Fig. 2-20 Switch Setting (Rear panel)

Set the controls as shown below.

①	BB SELECT	: NORMAL
②	CHARACTER	: ON
③	PLL CUT	: HIGH
④	CRT TRACE	: CHOP
⑤	THRESHOLD EXTENTION	: OFF
⑥	EXT/LINE SELECT	: LINE
⑦	MARKER SELECT	: SLIDE, INT
⑧	BB SELECT	: INT

(2) IF to IF (IF Amplitude, Group Delay, Linearity, Differential Phase, Differential Gain).

(a) Specifications

Table 2-6 IF - IF AMPL, GD, LIN, DP, DG Specifications

Models / Measurements	ME453K/L/M	ME538K/L/M	
	70MHz Band	70MHz Band	140MHz Band
Amplitude	±0.05dB/±25MHz	±0.05dB/±25MHz	±0.05dB/±25MHz, ±0.1dB/±40MHz, ±0.2dB/±50MHz
Group Delay	0.3ns/±15MHz, 0.5ns/±25MHz	0.3ns/±15MHz, 0.5ns/±25MHz	0.3ns/±20MHz, 0.5ns/±30MHz, 1ns/±50MHz
Linearity	0.2%/±25MHz	0.2%/±25MHz	0.2%/±50MHz
Differential Phase*	0.3°/±15MHz, 0.5°/±25MHz	0.3°/±15MHz, 0.5°/±25MHz	0.3°/±20MHz, 0.5°/±30MHz, 0.8°/±50MHz
Differential Gain*	0.2%/±15MHz, 0.4%/±25MHz	0.2%/±15MHz, 0.4%/±25MHz	0.3%/±20MHz, 0.4%/±30MHz, 0.6%/±50MHz

* : Sweep width = Carrier sweep width + 2fM

(b) Setup

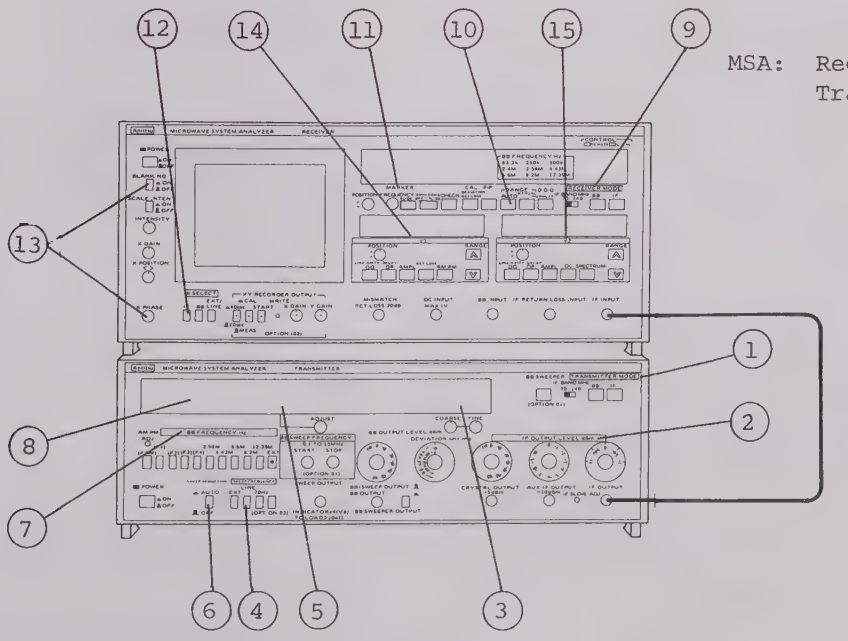


Fig. 2-21 IF to IF Test

(c) Procedures

(i) Connect the IF OUTPUT of the Transmitter to the IF INPUT of the Receiver.

(ii) Set the controls as shown below.

TRANSMITTER:

①	TRANSMITTER MODE	
	IF BAND	70 MHz or 140 MHz.
	BB, IF	IF.
②	IF OUTPUT LEVEL dBm	0 dBm.
③	IF CENTER FREQ MHz	70 MHz or 140 MHz.
④	SWEEP FREQUENCY	LINE.
⑤	SWEEP WIDTH ±MHz	25 MHz.
⑥	SWEEP REDUCTION	ON.
⑦	BB FREQUENCY Hz	200 kHz, 278 kHz or 250 kHz for Delay, Linearity Measurement. 5.6 MHz for DG, DP Measurement.
⑧	DEVIATION kHz rms	200 kHz rms for Delay Linearity Measurement. 500 kHz rms for DG, DP Measurement.

RECEIVER:

⑨	RECEIVER MODE	
	IF BAND	Same as Transmitter.
	BB, IF	IF.
⑩	RANGE	AUTO.
⑪	FREQ SELECT	MARKER, FREQUENCY - Set to ±25 MHz.
⑫	X SELECT	IF.
⑬	X PHASE	Adjust the knob to make the tracing marker pulses coincide with the retracing marker pulse while the BLANKING is OFF. After adjusting, set the BLANKING switch to ON.

(iii) IF Amplitude

⑭	Y1 selectors	AMPL
⑮	Y2 selectors	OFF

If the item key LEDs light, push these keys again. The LEDs turn off and these functions enter the OFF state.

⑯ Confirmation: Read the inherent slope on the CRT, and verify if it satisfies the amplitude specifications of section 2.4.3, (2), a.

Note: SLOPE ADJ is used for compensation of the cable characteristics.

(iv) GROUP DELAY & LINEARITY

⑦ (TRANSMITTER) Set as follows.
BB FREQ: Type K 200 kHz.
Type L 278 kHz.
Type M 250 kHz.

⑧ (TRANSMITTER)
DEVIATION: 200 kHz rms.

⑭ Y1 selectors: DELAY/DP.

⑮ Y2 selectors: LINEARITY/DG.

⑯ Confirmation: Read the slope of the trace on the CRT, and verify that it satisfies the group and linearity specifications of section 2.4.3, (2), (a).

(v) Differential Phase & Differential Gain

⑦ (TRANSMITTER)
BB FREQ: Set to 5.6 MHz.

⑧ (TRANSMITTER)
DEVIATION: 500 kHz rms.

⑭ Y1 selectors: DELAY/DP.

⑮ Y2 selectors: LINEARITY/DG.

⑯ Confirmation: Read the slope of the trace on the CRT, and verify that it satisfies the DP and DG specifications of section 2.4.3, (2), (a).

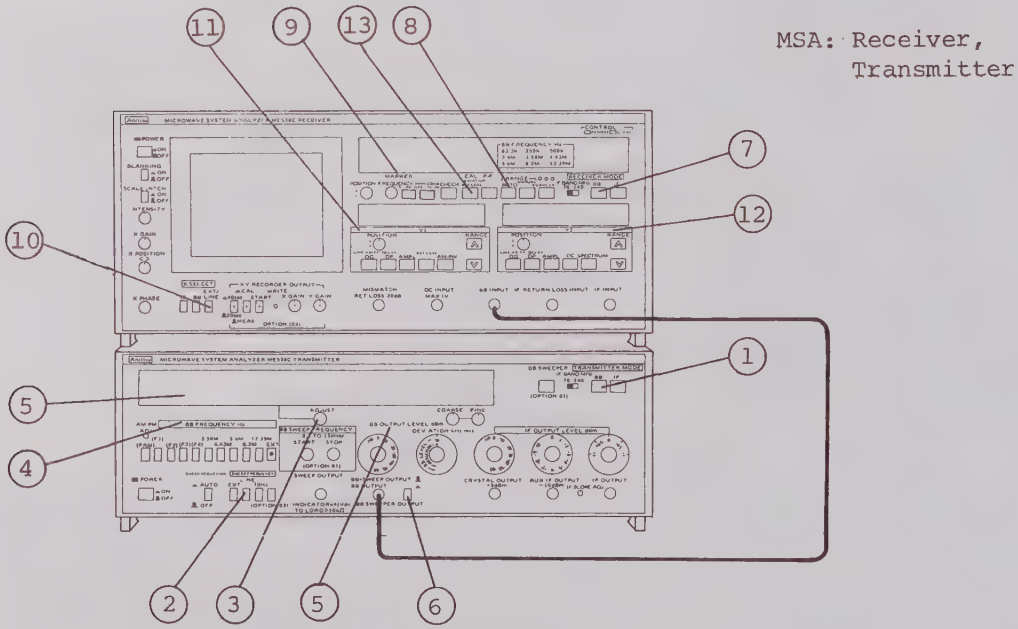
(3) BB to BB (Group Delay, Linearity, Differential Phase, Differential Gain).

(a) Specifications

Table 2-7 BB - BB Group Delay, Linearity, DP, DG Specifications

	Accuracy
Group Delay	±5% at 10 ns
Linearity	±10% at 10%
Differential Phase	±5% at 1°
Differential Gain	±10% at 10%

(b) Setup



MSA: Receiver, Transmitter

Fig. 2-22 BB to BB Test

(c) Procedures

(i) Connect the BB OUTPUT of the Transmitter to the BB INPUT of the Receiver.

(ii) Set the controls as shown below.

TRANSMITTER:

①	TRANSMITTER MODE BB, IF	BB.
②	SWEEP FREQUENCY	LINE.
③	SWEEP OUTPUT Vp/75 Ω	1 Vp
④	BB FREQUENCY	Set according to the calibration items. (Table 2-7)
⑤	BB OUTPUT LEVEL dBm	0 dBm.
⑥	(OUTPUT SELECT)	BB OUTPUT ▬

RECEIVER:

⑦	RECEIVER MODE	BB.
⑧	RANGE	AUTO.
⑨	FREQ SELECT	COUNTER.
⑩	X SELECT	LINE.
⑪	Y1	Set according to the calibration items. (Table 2-7)
⑫	Y2	OFF.
⑬	CAL	ON.

(iii) Read the separation between the two traces on the CRT, and compare it with the calibration value shown below and verify that it satisfies the specifications.

Calibration item	BB frequency	Calibration value	Specification
① Group Delay	K type: 200kHz L type: 278kHz M type: 250kHz	10ns	±5% at 10ns
② Linearity		10%	±10% at 10%
③ Differential Phase	5.6MHz	1°	±5% at 1°
④ Differential Gain		10%	±10% at 10%

(4) IF Return Loss

(a) Specifications

Inherent Slope: ±1 dB/70±25 MHz, -30 dBm
±1 dB/140±50 MHz, -30 dBm

(b) Setup

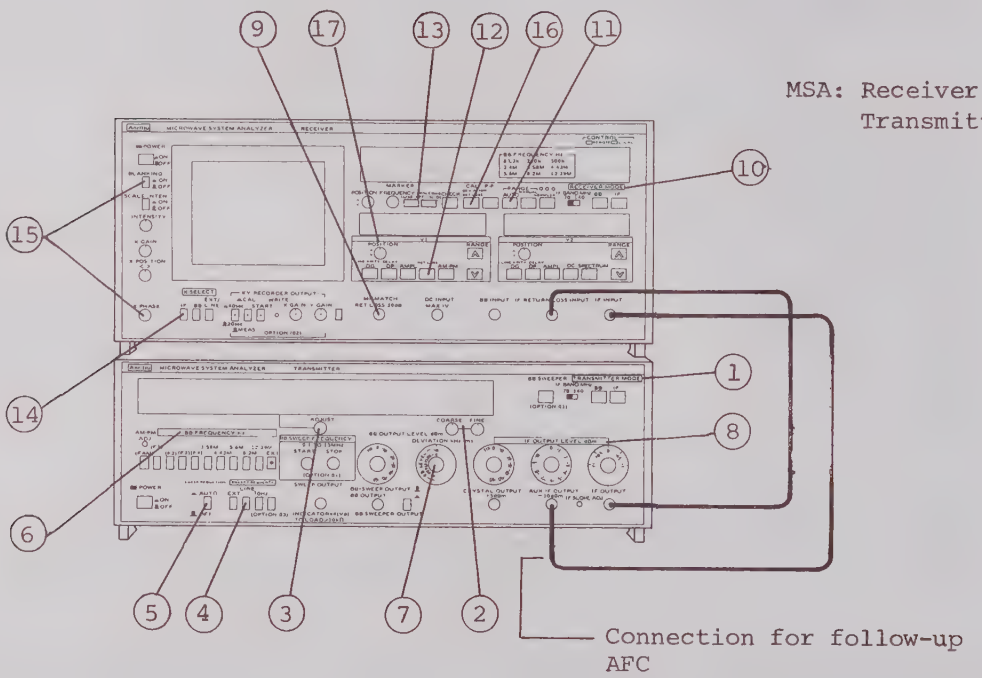


Fig. 2-23 IF Return Loss Test

(c) Procedures

(i) Connect the AUX IF OUTPUT of the Transmitter to the IF INPUT of the Receiver.

(ii) Connect the IF OUTPUT of the Transmitter to the IF Return Loss Input of the Receiver.

(iii) Set the controls as shown below.

TRANSMITTER:		
①	TRANSMITTER MODE	
	IF BAND	70 MHz or 140 MHz.
	BB, IF	IF.
②	IF CENTER FREQ	70 MHz or 140 MHz.
③	SWEEP WIDTH	70 MHz BAND: ±25 MHz, 140 MHz BAND: ±50 MHz
④	SWEEP FREQUENCY	LINE.
⑤	SWEEP REDUCTION	OFF.
⑥	BB FREQUENCY Hz	F2.
⑦	DEVIATION kHz rms	200 kHz rms.
⑧	IF OUTPUT LEVEL dBm	-30 dBm
RECEIVER:		
⑨	MISMATCH RET LOSS 20 dB	Not defined
⑩	RECEIVER MODE	
	IF BAND	Same as TRANSMITTER.
	BB, IF	IF.
⑪	RANGE	AUTO.
⑫	Y2 keys	RET LOSS.
⑬	FREQ SELECT	MARKER.
⑭	X SELECT	IF.
⑮	X PHASE, BLANDING	Adjust the knob to make the tracing marker image coincide with the re-tracing marker image while the BLANKING switch is OFF. After adjusting, set the BLANKING switch to ON.
⑯	CAL	Push this key twice. The calibration factor 20 dB is displayed on Y2 panel indicator.
⑰	POSITION	Adjust the 20 dB return loss image on CRT to the center of the Y axis scale.

(iv) Read the inherent slope of the CRT trace.

(v) Verify that the inherent slope is less than ±1 dB/70±25 MHz, ±1 dB/140±50 MHz.

(5) AM to PM Conversion

(a) Specifications

Residual PM: 0.3°/dB at 70±25 MHz
0.3°/dB at 140±35 MHz

(b) Setup

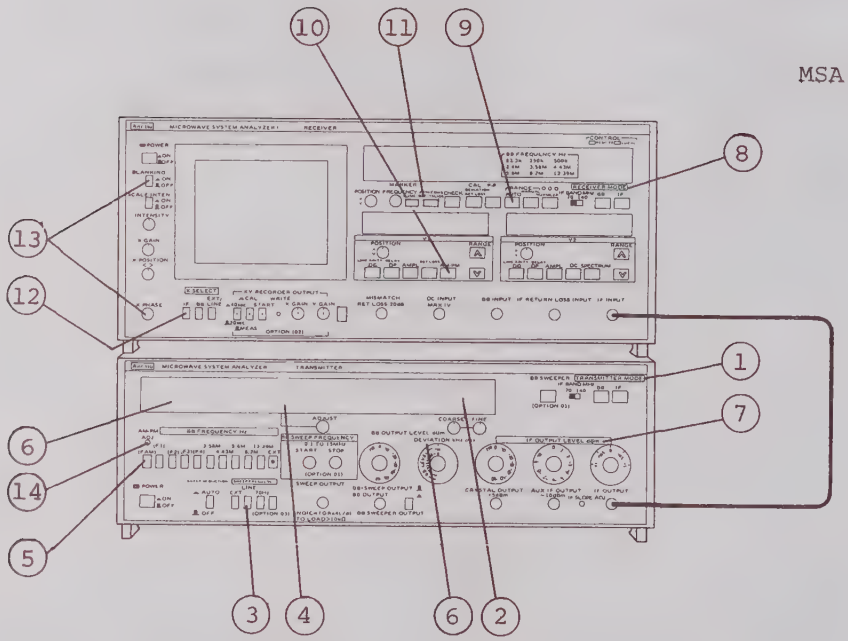


Fig. 2-24 AM to PM Conversion Test

(c) Procedures

(i) Connect the IF OUTPUT of the Transmitter to the IF INPUT of the Receiver.

(ii) Set the controls as shown below.

TRANSMITTER:		
①	TRANSMITTER MODE	
	IF BAND	70 MHz or 140 MHz.
	BB, IF	IF.
②	IF CENTER FREQ	70 MHz or 140 MHz.
③	SWEEP FREQUENCY	LINE.
④	SWEEP WIDTH ±MHz	Required sweep width.
⑤	AM-PM	Push. (a) IF OUTPUT signal is AM and FM modulated. (b) The modulation frequencies are K type-200 kHz, L type-278 kHz, M type-250 kHz. (c) The AM modulation frequencies are a little larger (500 Hz) than FM modulation frequencies.
⑥	DEVIATION kHz rms	Set to 200 kHz rms.
⑦	IF OUTPUT LEVEL dBm	Required level (-20 dBm to +10 dBm).
RECEIVER:		
⑧	RECEIVER MODE	
	IF BAND	Same as TRANSMITTER.
	BB, IF	IF.
⑨	RANGE	AUTO.
⑩	Y1 keys	AM-PM.
⑪	FREQ SELECT	MARKER.
⑫	X SELECT	IF.
⑬	X PHASE, BLANKING	Adjust the knob to make the tracing marker signal coincide with the re-tracing marker signal while the BLANKING switch is OFF.
⑭	AM-PM ADJ	Minimize the amplitude of the beat wave by adjusting knob of the TRANSMITTER, when the amplitude (peak to peak) is more than 0.3°/dB, as shown in Fig. a.

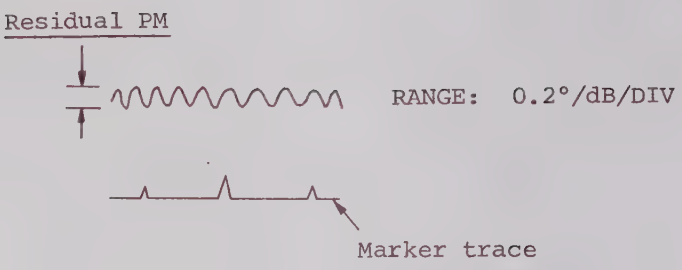


Fig. a Residual PM Beat Wave of CRT Trace

(iii) Read the peak to peak value (residual PM) of the CRT trace.

(iv) Verify that the residual PM is less 0.3°/dB.

(6) BB Amplitude (Optional)

(a) Specifications

Inherent Slope: ±0.5 dB/100 kHz to 13 MHz

(b) Setup

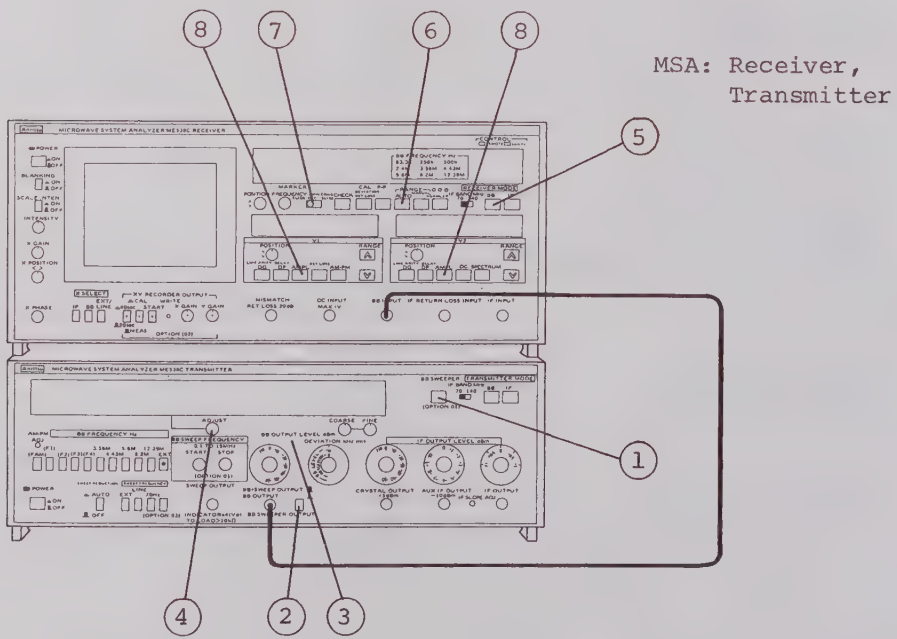


Fig. 2-25 BB Amplitude Test

(c) Procedures

(i) Connect the BB OUTPUT of the Transmitter to the BB INPUT of the Receiver.

(ii) Set the controls as shown below.

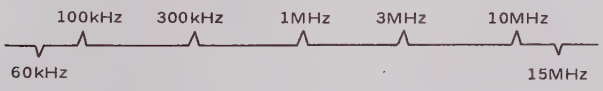
TRANSMITTER:

①	BB SWEEPER	Push.
②	(OUTPUT SELECT)	BB OUTPUT ▬
③	BB OUTPUT LEVEL dBm	0 dBm.
④	BB SWEEPER FREQUENCY	START: 100 kHz
		STOP : 13 MHz

RECEIVER:

⑤	RECEIVER MODE	BB.
⑥	RANGE	AUTO.
⑦	FREQ SELECT*	COUNTER.
⑧	Y1 or Y2 keys	AMPL.

*Note; Marker frequency on CRT



(iii) Read the inherent slope of the CRT trace.

(iv) Verify that the inherent slope is less than ±0.5 dB/100 kHz to 13 MHz.

2.5 TEST PERFORMANCE SHEET

The test performance sheets are made after careful inspection of your instrument.

Specification items other than the following are also checked and found to be correct.

DATE _____

TEST NO. _____

OPERATOR _____

TEMP _____

RELATIVE HUMIDITY _____

TESTED BY _____

TYPE ME453/538 K/L/M

MICROWAVE SYSTEM ANALYZER SERIAL NO. _____

NO.	INSPECTION ITEM	SPECIFICATION	RESULTS	REMARKS
2.4.1	Transmitter			
(1)	IF Output Level			
(a)	Level accuracy	±0.3dB/+4dBm	___ dB	
(2)	IF Center Frequency			
(a)	Center frequency accuracy	70MHz: ±10kHz±1digit (±20kHz)	___ kHz	
		140MHz: ±20kHz±1digit (±30kHz)	___ kHz	
(3)	IF Sweep Width			
(a)	Sweep width accuracy	±(displayed value × 3%)±0.5Hz		
		70±10MHz	___ MHz	
		70±25MHz	___ MHz	
		140±10MHz	___ MHz	
		140±50MHz	___ MHz	
(4)	FM Deviation			
(a)	Accuracy	±10% at buit-in BB frequency≦8.2MHz	___ kHz rms	Measure the item of F2 (BB Frequency) of the Transmitter
		K type 340kHz rms L type 472kHz rms M type 425kHz rms		
(5)	BB Output Level			
(a)	Level accuracy	±0.3dB/0dBm		
		F1	___ dB	
		F2	___ dB	
		F3	___ dB	
		F4	___ dB	
		3.58MHz	___ dB	
		4.43MHz	___ dB	
		5.6MHz	___ dB	
		8.2MHz	___ dB	
		12.39MHz	___ dB	

TYPE ME453/538 K/L/M

MICROWAVE SYSTEM ANALYZER SERIAL NO. _____

NO.	INSPECTION ITEM	SPECIFICATION	RESULTS	REMARKS
(6)	BB Frequency			
(a)	Frequency accuracy	±5Hz: F1 to F3 $\pm 5 \times 10^{-6}$: F4 to 12.39MHz		
		F1	___ Hz	
		F2	___ Hz	
		F3	___ Hz	
		F4	___ kHz	
		3.58MHz	___ kHz	
		4.43MHz	___ kHz	
		5.6MHz	___ kHz	
		8.2MHz	___ kHz	
		12.39MHz	___ kHz	
(7)	Sweep Output (BB+Sweep Output terminal)			
(a)	Level range	0 to ≥6.5Vp-p	___ to ___ Vp-p	
	Level accuracy	±10%/6Vp-p	___ %	
(8)	Sweep Output (Sweep Output terminal)			
(a)	Level range	0 to ≥25Vp-p	___ to ___ Vp-p	
	Level accuracy	±10%/24Vp-p	___ %	
(9)	AUX IF Output			
(a)	Level accuracy	±1dB/-10dBm		
		70MHz	___ dB	
		140MHz	___ dB	

TYPE ME453/538 K/L/M

MICROWAVE SYSTEM ANALYZER SERIAL NO. _____

NO.	INSPECTION ITEM	SPECIFICATION	RESULTS	REMARKS
(10)	Crystal Output			
(a)	Level accuracy	±1dB/+5dBm		
		70MHz	___ dB	
		140MHz	___ dB	
2.4.2	Receiver			
(1)	IF Input Level			
(a)	Level accuracy	±0.3dB/+4dBm		
		70MHz	___ dB	
		140MHz	___ dB	
(2)	BB Input Level			
(a)	Level accuracy	±0.3dB/0dBm		
		F1	___ dB	
		F2	___ dB	
		F3	___ dB	
		F4	___ dB	
		3.58MHz	___ dB	
		4.43MHz	___ dB	
		5.6MHz	___ dB	
		8.2MHz	___ dB	
		12.39MHz	___ dB	
(3)	FM Deviation			
(a)	Accuracy	±10% at built-in BB frequency≤8.2MHz	___ kHz rms	Measure the item at F2 (BB frequency) of the Transmitter.
		K type 340kHz rms L type 472kHz rms M type 425kHz rms		
(4)	Frequency Marker			
(a)	Center Marker accuracy	±100kHz/70MHz	___ kHz	
		±200kHz/140MHz	___ kHz	
(5)	X-Y recorder Output (Optional)			

TYPE ME453/538 K/L/M

MICROWAVE SYSTEM ANALYZER SERIAL NO. _____

NO.	INSPECTION ITEM	SPECIFICATION	RESULTS	REMARKS
(a)	Level	X: DC 0 to ≥4V	____ to ____ V	
		Y: DC 0 to ≥4V	____ to ____ V	
(6)	Phase Detection			
(a)	Capture range	F1: ±5Hz	- ____ to + ____ Hz	
		F2: ±5Hz	- ____ to + ____ Hz	
		F3: ±5Hz	- ____ to + ____ Hz	
		F4: $\pm 5 \times 10^{-6}$	- ____ to + ____ Hz	
		(2MHz: ±10Hz 2.4MHz: ±12Hz)		
		3.58MHz: $\pm 5 \times 10^{-6}$ (±18Hz)	- ____ to + ____ Hz	
		4.43MHz: $\pm 5 \times 10^{-6}$ (±22Hz)	- ____ to + ____ Hz	
		5.6MHz: $\pm 5 \times 10^{-6}$ (±28Hz)	- ____ to + ____ Hz	
		8.2MHz: $\pm 5 \times 10^{-6}$ (±41Hz)	- ____ to + ____ Hz	
		12.39MHz: $\pm 5 \times 10^{-6}$ (±62Hz)	- ____ to + ____ Hz	
(7)	DC Input			
(a)	Range accuracy	±5%		
		Range 1mV/DIV	_____ %	
		Range 2mV/DIV	_____ %	
		Range 5mV/DIV	_____ %	
		Range 10mV/DIV	_____ %	
		Range 20mV/DIV	_____ %	
		Range 50mV/DIV	_____ %	
		Range 100mV/DIV	_____ %	

TYPE ME453/538 K/L/M

MICROWAVE SYSTEM ANALYZER SERIAL NO. _____

NO.	INSPECTION ITEM	SPECIFICATION	RESULTS	REMARKS
2.4.3	Measurements			
(2)	IF to IF			
(a)				
(i)	IF Amplitude	±0.05dB/70±25MHz	± ____ dB	
		±0.05dB/140±25MHz	± ____ dB	
		±0.1dB/140±40MHz	± ____ dB	
		±0.2dB/140±50MHz	± ____ dB	
(ii)	Group Delay	0.3ns/70±15MHz	____ ns	Measure the item at F2 (BB frequency) of the Transmitter
		0.5ns/70±25MHz	____ ns	
		0.3ns/140±20MHz	____ ns	
		0.5ns/140±30MHz	____ ns	
		1.0ns/140±50MHz	____ ns	
(iii)	Linearity	0.2%/70±25MHz	____ %	
		0.2%/140±50MHz	____ %	
(iv)	Differential Phase	0.3°/70±20MHz	____ °	Measure the item at 5.6MHz (BB frequency) of the Transmitter
		0.5°/70±25MHz	____ °	
		0.3°/140±20MHz	____ °	
		0.5°/140±30MHz	____ °	
		0.8°/140±50MHz	____ °	
(v)	Differential Gain	0.2%/70±15MHz	____ %	Measure the item at 5.6MHz (BB frequency) of the Transmitter
		0.4%/70±25MHz	____ %	
		0.3%/140±20MHz	____ %	
		0.4%/140±30MHz	____ %	
		0.6%/140±50MHz	____ %	
(3)	BB to BB			
(a)	Group Delay	±5% at 10nS	____ %	Measure the item at F2 (BB frequency of the Transmitter)
(b)	Linearity	±10% at 10%	____ %	
(c)	Differential Phase	±5% at 1°	____ %	Measure the item at 5.6MHz (BB frequency of the Transmitter)
(d)	Differential Gain	±10% at 10%	____ %	

TYPE ME453/538 K/L/M

MICROWAVE SYSTEM ANALYZER SERIAL NO. _____

NO.	INSPECTION ITEM	SPECIFICATION	RESULTS	REMARKS
2.4.3				
(4)	IF Return Loss			
(a)	Inherent slope	±1dB/70±25MHz	____ dB	Measure the item at -30 dBm
		±1dB/140±50MHz	____ dB	
(5)	AM to PM conversion			
(a)	Residual PM	0.3°/dB, 70±25MHz	____ °	
		0.3°/dB, 140±35MHz	____ °	
(6)	BB Amplitude (Optional)			
(a)	Inherent slope	±0.5dB/100kHz to 13MHz	____ dB	

SECTION 3

PREPARATION OF REPAIR

3.1 INTRODUCTION

This section will explain method of disassembling the equipment and each unit, and instruments for repair and calibration.

WARNING: Hazardous voltage is present on parts marked:

WARNING

HAZARDOUS VOLTAGE UNDERNEATH REMOVAL OF COVER MAY INTERRUPT SERVICE

Do not touch these parts by hand.

3.2 DECOMPOSITION

3.2.1 Decomposition of Transmitter and Receiver

As shown in Fig. 3-1 below, the receiver and the transmitter are locked by 4 legs.

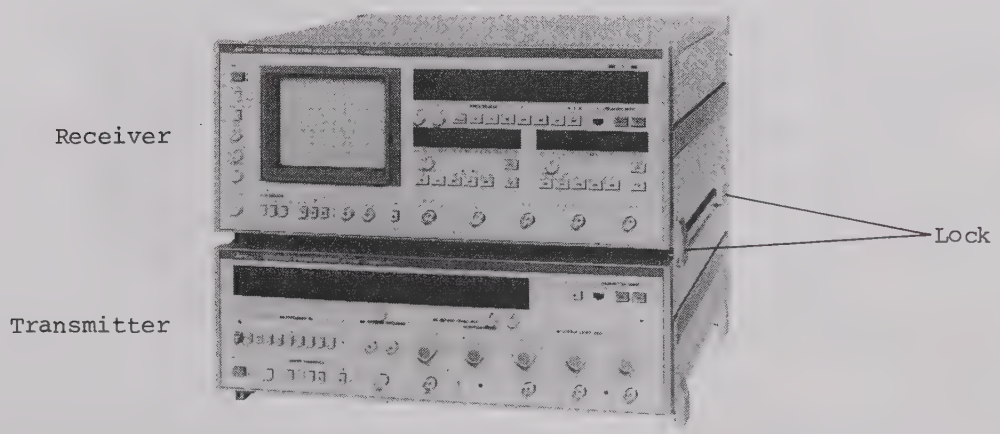


Fig. 3-1 Connection between transmitter and receiver

As shown in the detailed view of Fig. 3-2, the transmitter and the receiver are decomposed by raising the locks.

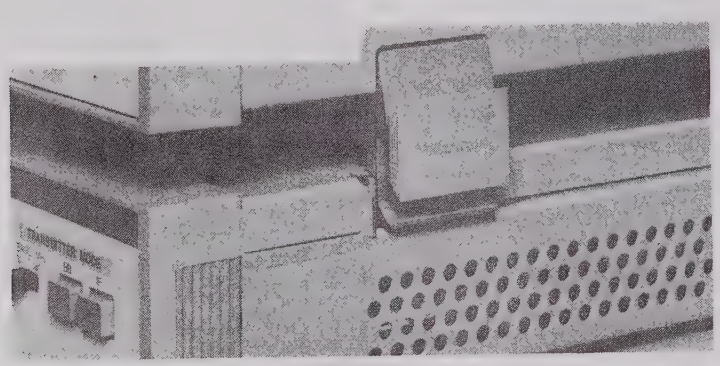


Fig. 3-2 Detailed view of leg

3.2.2 Removing the Outer Cover

(1) Removing top cover and bottom cover

Remove two each of screws of the top cover and bottom cover on the rear, and pull out the covers in the directions as shown in Fig. 3-3.

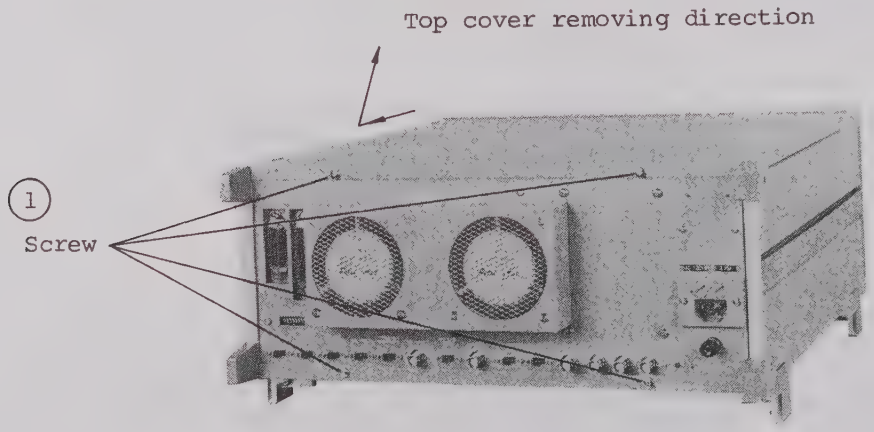


Fig. 3-3 Removing the outer cover

(2) Removing side cover

Open the screw covers as shown in Fig. 3-4: For transmitter, remove two screws (1) and take off the side cover . For receiver, remove two screws (1) and four screws (2), and take off the side cover.

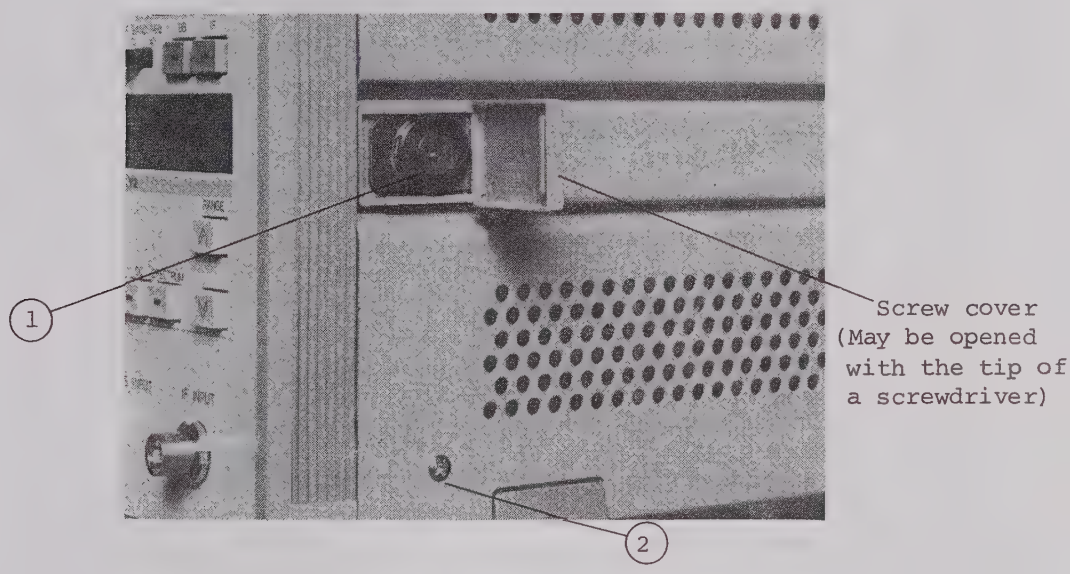


Fig. 3-4 Removing side cover

3.2.3 Removing CRT

The CRT may be removed following the procedures given below (see Fig. 3-5):

(1) Pull back the connector (1) and remove it.

(2) Remove the anode connector (2).

Note: When the connector (2) is removed, contact the electrode with the chassis to discharge the charge.

(3) Remove two screws (3) and remove the clamp

Remove four screws (4) and remove the clamp (front side CRT holding plate).

(4) Lift the CRT backward with left and right waving gently and remove it.

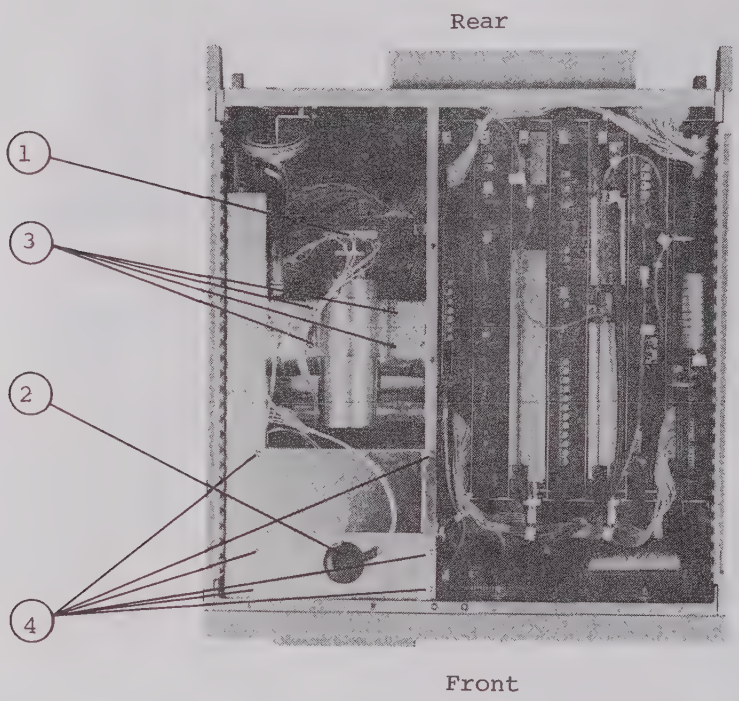


Fig. 3-5 Top view of receiver interior

3.2.4 Disassembly and Mechanical Parts List

Table 3-1 Mechanical Parts List (TRANSMITTER)

No.	PART NO.	DESCRIPTION	REMARKS	Q'ty
①	44E68583	Button		1
②	43H29179A	Button	ME453K,ME538K	1
	43H29179F	Button	ME453L,ME538L	1
	43H29179L	Button	ME453M,ME538M	1
③	43H29179B	Button	ME453K,ME538K	1
	43H29179G	Button	ME453L,ME538L	1
	43H29179M	Button	ME453M,ME538M	1
④	43H29179C	Button	ME453K,ME538K	1
	43H29179H	Button	ME453L,ME538L	1
	43H29179N	Button	ME453M,ME538M	1
⑤	43H29179D	Button	ME453K,ME538K	1
	43H29179J	Button	ME453L,ME538L	1
	43H29179P	Button	ME453M,ME538M	1
⑥	43H29179E	Button	ME453K,ME538K	1
	43H29179K	Button	ME453L/M,ME538L/M	1
⑦	44E68584A	Button		9
⑧	442E73198	Button	Standard	2
	Sweep freq(*)Hz 43H29179( )	Button	Option 03	1
	43H29179( )	Button	Option 05	1
⑨	442E73198	Button	ME453K/L/M	1
	44E68584A	Button	ME538K/L/M	1
⑩	44E58248D	frame, Button		1
⑪	44E58248C	frame, Button		16
⑫	44H74904	Knob	Standard	2
	442E73701A	Knob	Option 01	2
⑬	342E73701B	Knob		1
⑭	342E73701A	Knob		2
⑮	342E73717	Dial		3
⑯	342E73712B	Dial		2
⑰	43B28220D	Plate, BB LEVEL(-50dBm)	Control	1

Table 3-1 Mechanical Parts List (TRANSMITTER) (Cont'd)

No.	PART NO.	DESCRIPTION	REMARKS	Q'ty
⑱	44B74625A	Plate, BB LEVEL DEVIATION control		1
⑲	43B28220C	Plate, IF LEVEL(+10...60dB)	Control	1
⑳	43B28220B	Plate, IF LEVEL(0...10dB)	Control	1
㉑	44B74625B	Plate, IF LEVEL(+1...-1dB)	Control	1
㉒	442E81137B	Button	Standard	1
	442E80831A	Button	Option 01	1
㉓	442E80831B	Button		2
㉔	42B10306	front Panel	ME453K/L/M	1
	42B10305	front Panel	ME538K/L/M	1
㉕	44B74895G	Plate, model	ME453K	1
	44B74895H	Plate, model	ME453L	1
	44B74895J	Plate, model	ME453M	1
	44B74895K	Plate, model	ME538K	1
	44B74895L	Plate, model	ME538L	1
	44B74895M	Plate, model	ME538M	1
㉖	43B27405	Filter		1
㉗	422B10250	Shied cover		1
㉘		Screw		
㉙	43B23734	Cover Plate		2
㉚		Screw		
㉛	43H28312D	Heat Sink		1
㉜	43H28312C	Heat Sink		1
㉝	44B70418B	Cover		2
㉞		Screw		
㉟	33B22510C	Cover, Top		1
㊱	33B22458	Cover, Buttom		1
㊲		Screw		
㊳	33B22470	Cover, Side		2
㊴	349B73661	Handle, Side		2
㊵		Screw		
㊶	33B20662	Protector		4
㊷	349B73667	Foot, Stack		4

Table 3-1 Mechanical Parts List (TRANSMITTER) (Cont'd)

No.	PART NO.	DESCRIPTION	REMARKS	Q'ty
㊸		Screw		
㊹	34B78330 A	Clamp Panel		3
㊺	34B78330 B	Clamp Panel		3

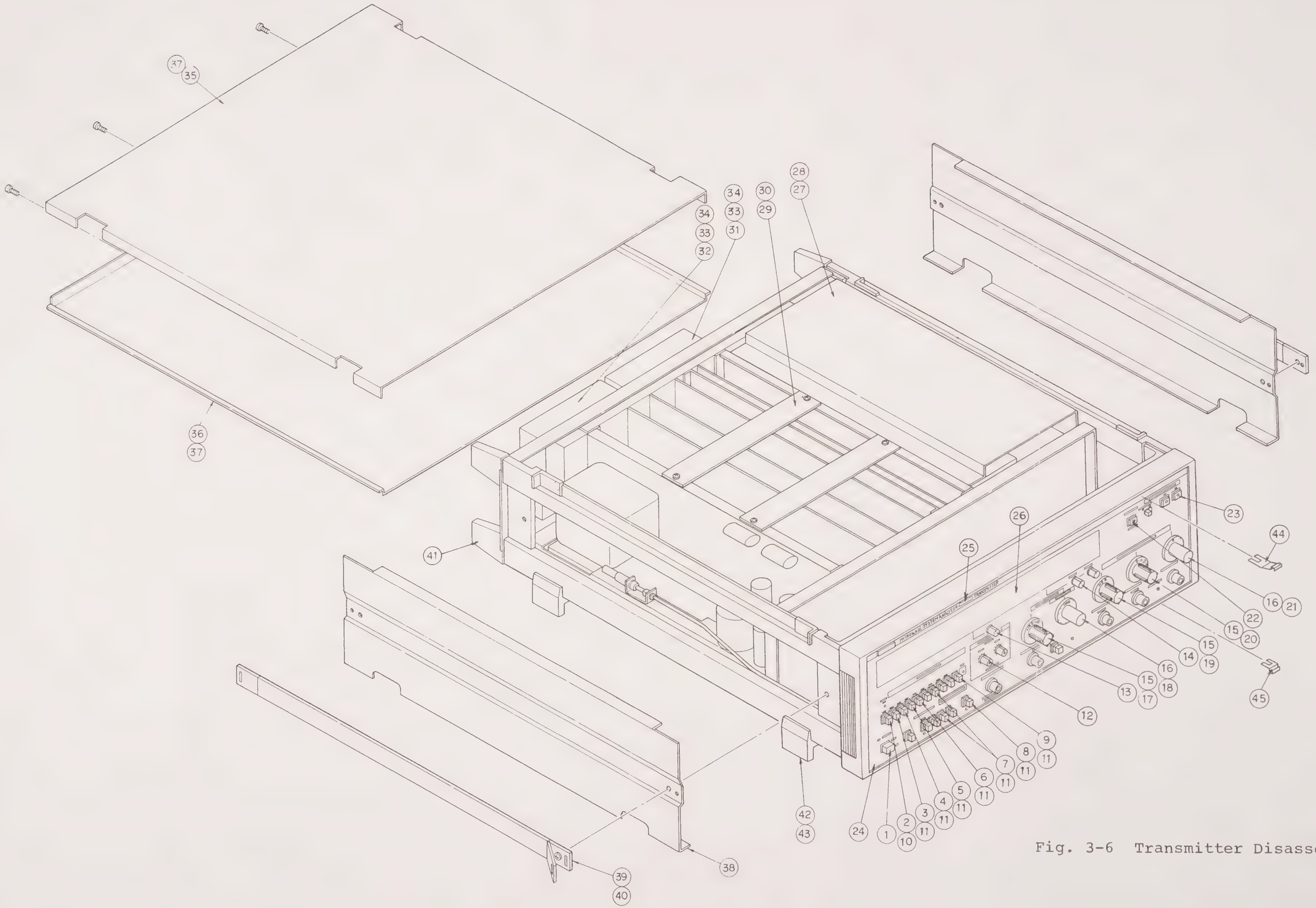


Fig. 3-6 Transmitter Disassembly

Table 3-2 Mechanical Parts List (RECEIVER)

No.	PART NO.	DESCRIPTION	REMARKS	Q'ty
①	44E68583	Button		1
②	44E68584A	Button		5
③	44E58248C	Button flame		9
④	342E73701B	Knob		2
⑤	342E73701A	Knob		6
⑥	442E73198	Button	Standard	3
	44E68584A	Button	Option 02	3
	44E68584A	Button	Option 04	1
⑦	322E7685	Bezel		1
⑧	44H72380	Filter		1
⑨		Screw		
⑩	44H74904	Knob	Standard	2
	342E73701A	Knob	Option 02	2
⑪	43H30841A	Filter	ME453K	1
	43H30841B	Filter	ME453L	1
	43H30841C	Filter	ME453M	1
	43H30841D	Filter	ME538K	1
	43H30841E	Filter	ME538L	1
	43H30841F	Filter	ME538M	1
⑫	44B74893	Spring		2
⑬	442E80831A	Button		15
⑭	44H71717	Filter		2
⑮	442E81136	Button		4
⑯	442E81137	Button		1
⑰	442E80831B	Button		2
⑱	42B10307	front Panel	ME453K/L/M	1
	42B10308	front Panel	ME538K/L/M	1
⑲	44B74895G	Plate, model	ME453K	1
	44B74895H	Plate, model	ME453L	1
	44B74895J	Plate, model	ME453M	1
	44B74895K	Plate, model	ME538K	1
	44B74895L	Plate, model	ME538L	1
	44B74895M	Plate, model	ME538M	1

Table 3-2 Mechanical Parts List (RECEIVER) (Cont'd)

No.	PART NO.	DESCRIPTION	REMARKS	Q'ty
⑳	44B73002	Clamp		1
㉑		Screw		
㉒	34B69913D	Cylinder, Shield		1
㉓	44B64313	Clamp		2
㉔	34E67754D	Rubber Spacer		2
㉕		Screw		
㉖	43B29174	Plate		1
㉗		Screw		
㉘				1
㉙	34E67754B	Spacer, Rubber		1
㉚	43B32052	Case, Shield		1
㉛		Screw		
㉜	43B32144	Cover for fan		1
㉝		Screw		
㉞	33B22452	Cover, Top		1
㉟	43B29185	Cover, Bottom		1
㊱		Screw		
㊲	43B29186	Cover, Left side		1
㊳	33B22472	Cover, Right side		1
㊴		Screw		
㊵	349B73661C	Handle, Side		2
㊶		Screw		
㊷	33B20662	Protector		4
㊸	349B73667	Foot, Stack		4
㊹		Screw		
㊺	43H28311	Protective Plate		1
㊻	44N69391	Label		1
㊼		Screw		
㊽	34B78330A	Clamp Panel		3
㊾	34B78330B	Clamp Panel		3

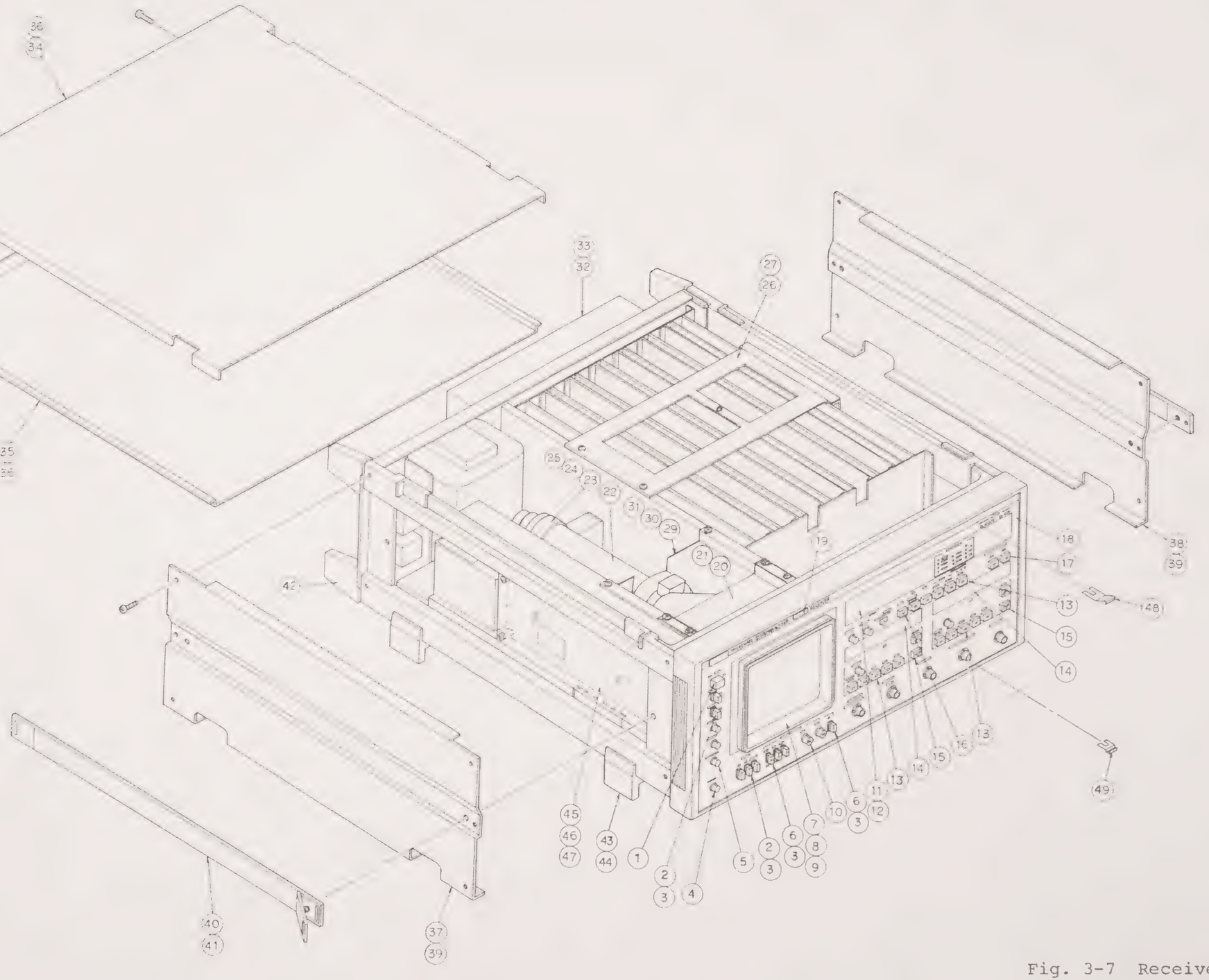


Fig. 3-7 Receiver Disassembly

3.3 Instruments and Accessories Required for Calibration, Adjustment, Troubleshooting and Repair

3.3.1 Instruments

Table 3-3 Instruments Required for Calibration, Adjustment, Troubleshooting and Repair

Generic Term	Minimum Use Specifications	Calibration Equipment
STANDARD LEVEL METER	(1) Frequency range : 10 kHz to 200 MHz or more (2) Level measurement range : -10 dBm to +6 dBm (3) Level measurement accuracy : Within ±0.1 dB (4) Input impedance : 75 Ω	ML59B
FREQUENCY COUNTER	(1) Measuring frequency range : 10 kHz to 1 GHz (2) Input level range : -15 dBm (3) Measuring frequency resolution : 1 kHz	MF76A MF63A
SPECTRUM ANALYZER	(1) Frequency range : 10 kHz to 1.7 GHz	MS62B
DIGITAL VOLTMETER	(1) Voltage measurement range : 1 mV to 100 V	-
OSCILLOSCOPE	(1) Frequency range : dc to 30 MHz (2) Input level range : 5 mV/div to 10 V/div	-
ELECTRONIC VOLTMETER	(1) Frequency range : 10 kHz to 1 GHz (2) Measuring voltage rnage : 300 V to 3 Vrms (3) Input impedance : Below 1 pF	ML69A
SYNTHESIZER	(1) Frequency range : 10 kHz to 200 MHz (2) Output Level : 0 dBm (3) Output impedance : 75 Ω	MG545A
μP BOARD ANALYZER	8085 Test Pod	MS020A

3.3.2 Accessories

(1) Extender board

pc board 432U29286

Connector 225J-22221-587 (DDK)

The extender board is mounted in the receiver unit as a standard component (or attached).

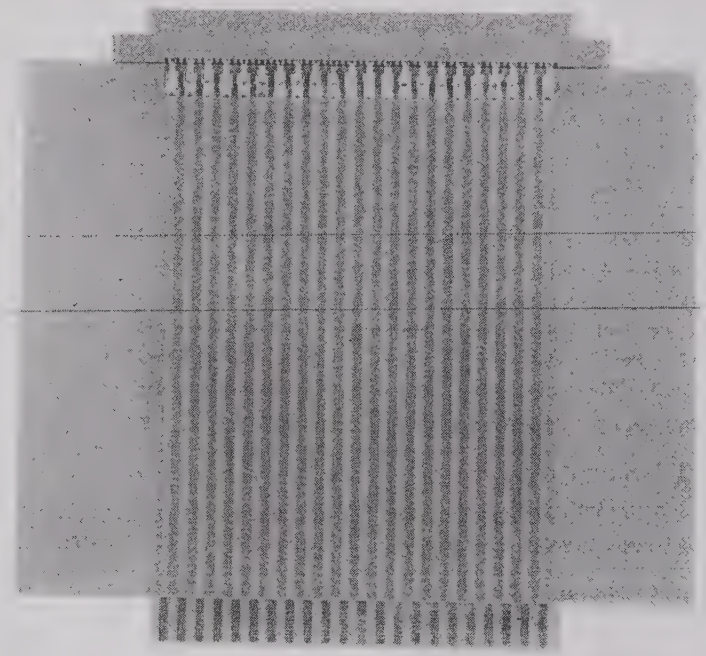


Fig. 3-8 Extender Board

(2) Service kit

This kit is used when checking the internal characteristics of this equipment.

Table 3-4 Service Kit (44Y75388)

No.	Description	Q'ty	SPEC. No.
1	BNC-A611 (BNC-A-JJ75) adapter	1	No. 1289
2	BNCJ-UMP (27DP/NSJ) adapter	2	No. 1305
3	27DP-P-1.5 cable (10 cm)	2	449J75994
4	PI011-2F - OPEN cable (40 cm)	2	449J75995 □ J1:A, J2:B

SECTION 4

CALIBRATION AND ADJUSTMENT

4.1 INTRODUCTION

This section explains the methods by which the output level is set for each unit and describes the input calibration for the level meter.

Internal Deviation:

Because the amplifier and the mixer of the present measuring equipment are designed for wide bands, the equipment is not equipped with equalizers for Delay (DP), Linearity (DG), AMPL, and Return Loss. When problems with components occur, a loose contact in the printed circuit boards, cable, etc. can cause an increase in internal deviation. Consequently, calibration is unnecessary.

Calibration of Delay (DP), Linearity (DG), Ampl:

The accuracy of these calibrations does not vary unless parts are damaged or surrounding circuits deteriorated. Therefore, as a rule, it is not necessary to make calibrations. In a problem occurs, replace the faulty part in compliance with the procedures explained in Section 5.

4.1.1 General Maintenance

Table 4-1 General maintenance

Check	Period	Procedure
Dirt	• Before storing for an extended period of time	Wipe off with industrial cleaning solvent
Dust, etc.	• When used in a dusty environment • When dirt is noticeable	Remove the cover and blow out with compressed air
Lubrication	Unnecessary	
Loose knobs screws	When found	Retighten

WARNING: Hazardous voltage is present on parts marked:

Do not touch these parts by hand.

4.2 TRANSMITTER

The transmitter will appear as shown in Fig. 4-1 when its top cover is removed (see paragraph 3.2.2). Some calibration items may be adjusted from the top using a screwdriver. However, the calibration variable resistors for some calibration items are located inside the pc board and, therefore, they must be adjusted using the extender board with the pc board out of the cabinet. Since the extender board is incorporated in the receiver unit, it must be taken out, when needed, by first removing the top cover of the receiver. The extender board is provided as an accessory for some models.

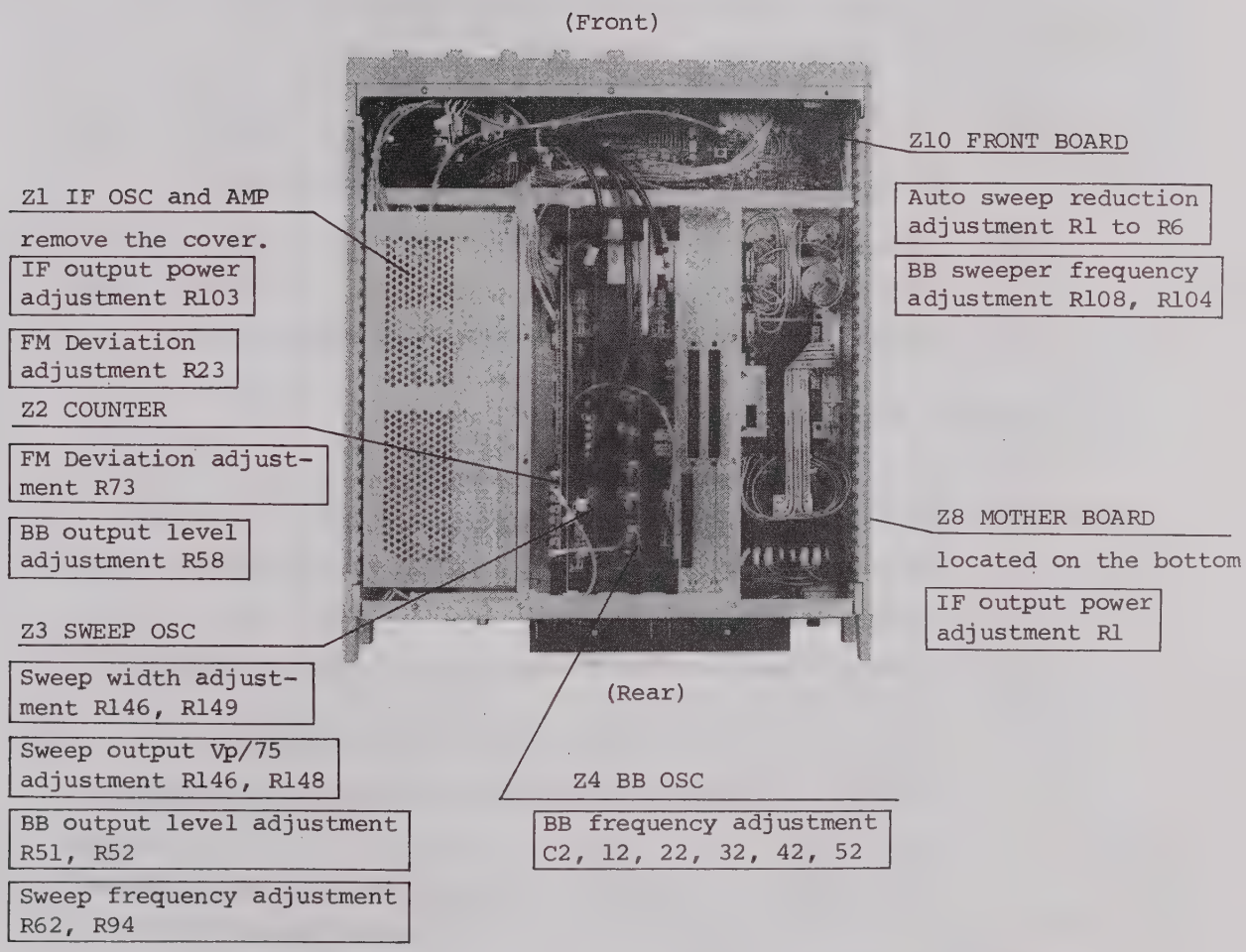


Fig. 4-1 Internal View of Transmitter (Top View)

4.2.1 IF OUTPUT Power

(1) Set the sweep width and FM deviation to zero.

(2) Set the IF output level dial to 0 dBm and connect the power meter to the IF OUTPUT terminal.

(3) Set the vernier dial to +1.0 (dB), and adjust the variable resistor R103 on Z1 (see 5.2.3) so that the power meter indicates +1.0 dBm.

(4) Set the vernier dial to -1.0 (dB), and adjust the variable resistor R1 on Z8 mother board (see 5.2.8) so that the power meter indicates -1.0 dBm.

(5) Repeat steps (3) and (4) two or three times, and make necessary adjustments so that the vernier dial and IF output power coincide with each other.

4.2.2 SWEEP WIDTH ±MHz

(1) Turn the adjust knob fully counterclockwise and confirm that the indication is "0.0". If "0.0" indication cannot be obtained in this manner, use variable resistor R146 on Z3 (OFFSET) (see 5.2.5).

(2) Connect the IF OUTPUT terminal to the IF INPUT terminal, and turn the adjust knob so that the sweep width is ±20 MHz using the SLIDE MARKER function. Confirm that the LED indicator reading is within "20.0" ±10% at this time. If a different indication is obtained, adjust the variable resistor R149 on Z3 (see 5.2.5) so that the LED indicator reading is "20.0".

Note: This adjustment must be made with the SWEEP REDUCTION switch set in the OFF position.

4.2.3 SWEEP OUTPUT Vp/75Ω

(1) Turn the adjust knob fully counterclockwise and confirm that the indication is "0.00". If "0.00"

indication cannot be obtained in this manner, use variable resistor R146 on (OFFSET) (see 5.2.5).

(2) Terminate the BB+SWEEP OUTPUT terminal by the 75Ω resistor and observe the voltage of this terminated resistance with an oscilloscope. Turn the adjust knob clockwise to align the voltage on the oscilloscope with 2.0 V peak and confirm that the LED indicator reading at this time is within "2.00" ±10%. If a different LED indicator reading is obtained, adjust it to "2.00" using the variable resistor R148 on Z3 (see 5.2.5).

4.2.4 BB OUTPUT Level

This adjustment is delicate and should be carried out with care.

Adjustment of continuous dial

(1) Adjustment of variable width: Connect the level meter which is covered BB band to the BB OUTPUT terminal. Vary the continuous dial within the range of 0 to -10 (dB) and confirm that the indicated value on the power meter varies 10 dB. If a different value is obtained, adjust R51 on Z3 (see 5.2.5) so that its indicated value varies 10 dB.

(2) Then, set the step dial to "0 dBm" and the continuous dial to "0 dB", and adjust the variable resistor R52 on Z3 (see 5.2.5) so that the power meter indicates 0 dBm.

Adjustment of numerical LED

(3) Confirm that the LED indicator reading is within 0 dBm ±0.3 dB when the power meter reading is 0 dBm. If a different value is obtained, adjust the LED indicator reading to 0 dBm using the variable

resistor R58 on Z2 (see 5.2.4).

4.2.5 FM DEVIATION

(1) Set the FM DEVIATION dial to 1000 kHz rms, and adjust the variable resistor R73 on Z2 (see 5.2.4) so that the LED indicator for DEVIATION indicates "1000".

(2) Then, set the DEVIATION LED indicator and the BB FREQ with the FM DEVIATION dial as shown in the table below, and connect the IF OUTPUT terminal to the IF INPUT terminal. The measuring item of the receiver shall be SPECTRUM.

Model	BB FREQ	LED indication
K	200 kHz	340 kHz rms
L	277.778 kHz	472 kHz rms
M	250 kHz	425 kHz rms

(3) Adjust the BB signal level using the variable resistor R23 on Z1 (see 5.2.3) so that the spectrum on the receiver CRT is first carrier zero (2.405 radians).

4.2.6 IF CENTER FREQ

Since the center frequency is counted and displayed on the internal frequency counter, it need not be calibrated.

4.2.7 BB FREQUENCY

(1) Since the frequency of the BB OSC of less than 556 kHz sufficiently satisfies the specification, no calibration is required.

(2) If the frequency of the high frequency OSC deviates

from the specification, make a necessary adjustment using the following variable capacitance on Z4 (see 5.2.6).

2 MHz or 2.4 MHz	:	C52
3.58 MHz	:	C42
4.43 MHz	:	C32
5.6 MHz	:	C22
8.2 MHz	:	C12
12.39 MHz	:	C2

4.2.8 SWEEP REDUCTION

If the reduction sweep width of the auto sweep reduction function is abnormal, make a necessary adjustment using the following variable resistors on Z10 (see 5.2.10):

2 MHz or 2.4 MHz	:	R1
3.58 MHz	:	R2
4.43 MHz	:	R3
5.6 MHz	:	R4
8.2 MHz	:	R5
12.39 MHz	:	R6

4.2.9 SWEEP FREQUENCY

The frequency of the sweep OSC may be adjusted using the following variable resistors on Z3 (see 5.2.5) block:

70 Hz	:	R62
Optional sweep frequency	:	R94

4.2.10 BB SWEEPER FREQUENCY

This adjustment should be made with care because an excessively wide variable range may result in an unstable operation.

(1) START frequency: Set the minimum value 60 kHz while observing the BB AMPL frequency marker of the receiver.
Turn the START knob fully counterclockwise and adjust the variable resistor R108 on Z10 (see 5.2.10) so that the 60 kHz frequency marker appears at left end on the receiver CRT.

(2) STOP frequency: Turn the STOP knob fully clockwise and adjust the variable resistor R104 on Z10 (see 5.2.10) so that the 15 MHz marker appears.

4.3 RECEIVER

When the top cover of the receiver is removed (see paragraph 3.2.2), the receiver will appear as shown in Fig. 4-2. Some calibration items may be adjusted from the top with a screwdriver, and some must be adjusted with the extender (should be taken out of the receiver unit by removing the fixing screws) with the pc board out of the cabinet.

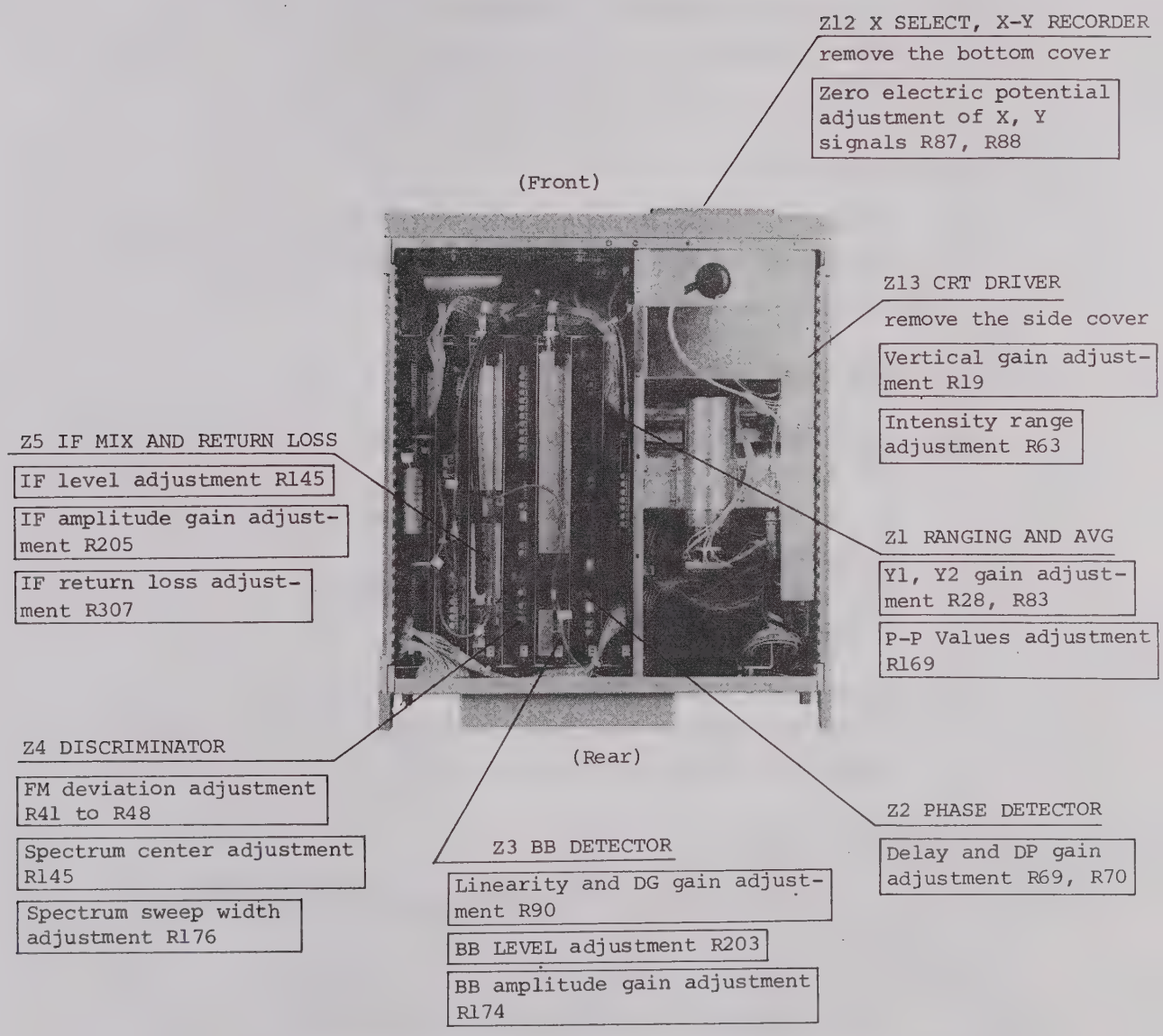


Fig. 4-2 Internal View of Receiver (Top View)

4.3.1 IF LEVEL dBm

(1) Input the IF signal whose frequency is 70 MHz or 140 MHz and power is +4.0 dBm, and confirm that the LED indicator reading is within 4.0 dBm ±0.3 dB.

(2) If the LED indicator reading is other than the value indicated above, adjust it to "4.0" using the variable resistor R281 on Z3 (see 5.3.5).

4.3.2 SLIDE MARKER

Since the frequency of the SLIDE MARKER is counted and displayed on the internal frequency counter, no calibration is required.

4.3.3 BB LEVEL dBm

(1) Input the BB signal whose frequency is approximately 200 kHz (one frequency within the range of 50 kHz to 15 MHz) and power is 0.0 dBm to the BB input terminal.
Confirm that the LED indicator reading at this time is within 0 dBm ±0.3 dB.

(2) If a value other than that indicated above is obtained, adjust the LED indicator reading to "0.0" using the variable resistor R298 on Z3 (see 5.3.5).

4.3.4 DEVIATION kHz rms

A warm-up period of approximately 30 minutes is required prior to this calibration.

(1) When the first carrier zero is displayed on the CRT using the SPECTRUM function, the FM deviation of the IF INPUT signal will be as shown in the table below.

Low BB Frequency	First carrier zero deviation kHz rms	Z4 adjuster
66.666 kHz	133	R41
200 kHz	340	R42
400 kHz	680	R43
92.593 kHz	157	R41
277.778 kHz	472	R42
555.556 kHz	945	R43
83.333 kHz	142	R41
250 kHz	425	R42
500 kHz	850	R43

Confirm that the difference of the LED indicator reading of the deviation is within ±10% of the above values. Otherwise, make necessary adjustments using variable resistors R41 through R43 (see the above table) on Z4 (see 5.3.6).

Note : This calibration is required as an adjustment prior to using the deviation CAL function. Therefore, if the "CAL" marker appears near the LED indicator, the power source should be turned OFF to erase the "CAL" marker and then the adjustment should be carried out again.

(2) The best way to calibrate the high BB frequency deviation is to use the IF signal source which has a stable FM deviation value. If it is not available, then use the IF signal of the transmitter. Press the transmitter BB frequency select switches sequentially, and adjust the high frequency deviation reading to match the low frequency deviation using the variable resistors shown in the table below.

High BB frequency	Z4 deviation adjuster
2 or 2.4 MHz	R44
3.58 MHz	R45
4.43 MHz	R46
5.6 MHz	R47
8.2 MHz	R48

4.3.5 Adjustment of Scale Sensitivity

For each of the delay, DP, linearity, DG, and BB ample measuring items, two trace lines will appear on the CRT when the CAL key is pressed. Align this CAL split trace line with the scale.

(1) Gain of Y axis amplifier for the CRT may have been deviated if the CAL split trace line of each of the above measuring items deviates in an equal proportion. Make a necessary adjustment using the variable resistor R19 on Z13 (see 5.3.14) in such case.

(2) If the scale sensitivity of Y1 and that of Y2 differ from each other, make a necessary adjustment using the variable resistor R23 or R83 on 5.3.3 Z1 (see 5.3.3).

(3) Delay

The split trace line of 10 ns will appear on the CRT when the CAL switch is pressed. Align the split trace to 5 DIV using the variable resistor R70 on Z2 (see 5.3.4), with the RANGE select set to 2 ns/DIV.

(4) DP

The 1 degree split trace line will appear on the CRT when the CAL switch is pressed. Align the

split trace line with 5 DIV using the variable resistor R69 on Z2 (see 5.3.4), with the RANGE select set to 0.2 DEG/DIV.

(5) Linearity and DG

The 10% split trace line will appear on the CRT when the CAL switch is pressed. Align the split trace line to 5 DIV using the variable resistor R90 on Z3 (see 5.3.5), with the RANGE select set to 2%/DIV. The scale sensitivity of the BB amplitude may be deviated as a result of this adjustment. Therefore, the scale sensitivity must be checked.

(6) BB AMPLITUDE (Option)

The split trace line of 1 dB will appear on the CRT when the CAL switch is pressed. Align the split trace to 5 DIV using the variable resistor R174 on Z3 (see 5.3.5), with the RANGE select set to 0.2 dB/DIV.

(7) BB RETURN LOSS (Option)

Since the BB RETURN LOSS shares the same circuit with the BB amplitude, the sensitivity may also be adjusted in accordance with item (6) above.

(8) IF AMPLITUDE

Connect the IF INPUT terminal to the IF OUTPUT terminal and set the RANGE to 1 dB/DIV. Vary the attenuator of the transmitter by 2 dB, and confirm that the trace line on the CRT deviates by 2 divisions. If not, make a necessary adjustment using the variable resister R205 on Z5 (see 5.3.7) so that the trace line shifts 5 divisions.

4.3.6 Centering of SPECTRUM

If the spectrum image on the CRT is not at the center of the horizontal axis, it must be centered.

When the spectrum image is at the center of the horizontal axis, it means that the intermediate frequency the receiver is accurately 17.8 MHz.

(1) Input a signal of approximately 70 MHz or 140 MHz to the IF INPUT and activate the SPECTRUM function.

(2) Then, adjust the variable resistor R145 on Z4 (see 5.3.6) so that the carrier spectrum on the CRT comes to the center of the horizontal axis.

4.3.7 SPECTRUM SWEEP WIDTH

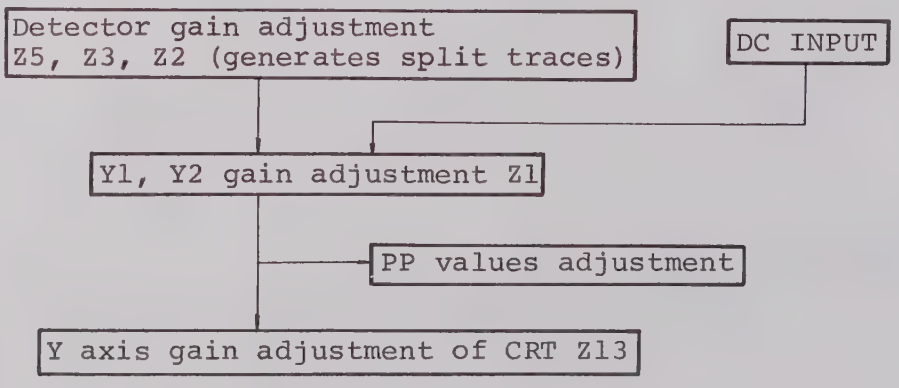
The spectrum sweep width is normally set to approximately ±700 kHz, which may be varied using the variable resistor R176 on Z4 (see 5.3.6).

4.3.8 P-P

If the amplitude on the CRT and the P-P value indicated on the LED are different adjust R169 on Z1 (see 5.3.3) so that the P-P value is equal to the amplitude on the CRT.

Note: Sensitivity adjustment

Gain may deviate as a result of gain adjustment of each PC board as shown in the following diagram. Therefore, care should be exercised in selecting the PC board to be adjusted and the adjustment result.



4.3.9 X-Y RECORDER OUTPUT

CAL

Align the CAL position indicating the range to be traced on the X-Y recorder with the top end and bottom end of the CRT scale, using the variable resistor R45 on Z12 (see 5.3.13).

Zero electric potential

Align the left lower part with zero electric potential using the following variable resistors:

X: R87 (Z12)

Y: R88 (Z12)

4.3.10 INTENSITY

Brightness at the maximum of the INTENSITY may be varied by adjusting the variable resistor R63 on Z13 (see 5.3.14). However, it should be noted that an optimum focus may not be obtained with an excessive brightness.

SECTION 5

TROUBLESHOOTING AND REPAIR

5.1 INTRODUCTION

This section describes how to repair the transmitter and the receiver which compose the microwave system analyzer.

Section 5.2 describes composition of the transmitter, troubleshooting for locating the faulty place from the fault phenomenon, and individual circuits.

Section 5.3 describes the same topics about the receiver.

Individual circuits are described for each PC board. When a failure occurs on the equipment, the faulty PC board is located as follows:

(1) Failure of transmitter

See Paragraph 5.2.2 Troubleshooting the Transmitter.

(2) Failure of Receiver

See paragraph 5.3.2 Troubleshooting the Receiver

Then, the required repair is made referring to the circuit description, waveform and level shown in the circuit diagram of the faulty PC board.

The fuses used in this equipment are shown in Table 5-1.

Table 5-1 List of Fuse

Item	Units	Current	Q'ty	Name	Remarks
1	Transmitter	2A	2	MF51NN250V2AAC05	see 5.2.1 F1,F2
2	Receiver	3A	2	MF51NN250V3AAC05	see 5.3.1 F1,F2
3	Receiver Z14 Power Supply				
	(1) +5 V (Digital)	2A	1	MF51NN25V2ADC01	see 5.3.15 F1
	(2) +5 V (Analog)	2A	1	MF51NN25V2ADC01	see 5.3.15 F2
	(3) +12 V	2A	1	MF51NN25V2ADC01	see 5.3.15 F3
	(4) -12 V	2A	1	MF51NN25V2ADC01	see 5.3.15 F4

5.2 TRANSMITTER

5.2.1 General

The transmitter unit consists of the IF signal generator section, BB signal generator section, and SWEEP signal generator section.

IF signal generator section has the FM modulation and sweep functions, which generates the swept signal of 70 MHz or 140 MHz band.
The IF signal generator section also has a stable built-in crystal oscillator of 70 MHz or 140 MHz.

BB signal generator section generates highly stable BB signals using a crystal oscillator and also generates BB+SWEEP signals by synthesizing SWEEP signals.

SWEEP signal generator section generates signals for sweeping the IF signals.
The block diagram is shown in Fig. 5-5.
The circuit consists of 9 PC boards, Z1 through 5 and Z8 through Z11 each of which has the following functions:

Z1: IF OSCILLATOR AND AMPLIFIER generates signals of 70 MHz band or 140 MHz band.

Z2: COUNTER is the circuit which counts the IF

center frequency and displays the FM deviation sweep width, BB level, and sweep level.

Z3 SWEEP OSCILLATOR AND BB AMPLIFIER consists of the ALC LOOP for stabilizing the BB signal level and the sweep signal generator.

Z4 BB OSCILLATOR is the BB signal generator using a highly stable crystal oscillator.

Z5 CRYSTAL OSC AND BB SWEEPER consists of a stable crystal oscillator of 70 MHz or 140 MHz and a circuit which generates the BB sweep signals.

Z8 MOTHER BOARD is the circuit for connecting the various PC boards.

Z9 LED BOARD is the circuit for displaying various parameters.

Z10 FRONT BOARD consists of the output circuit for BB signals and a circuit for generating the sweep signals of the BB SWEEPER.

Z11 POWER SUPPLY is +12 V, -12 V, +5 V and -5 V dc power supplies.

Z12 SWITCH BOARD is the circuit which selects the sweep frequencies.

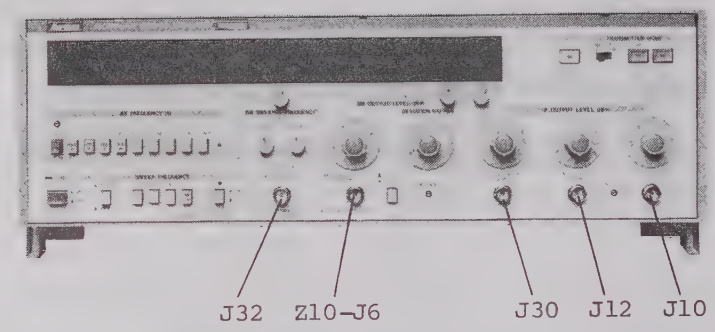


Fig. 5-1 Front View of Transmitter

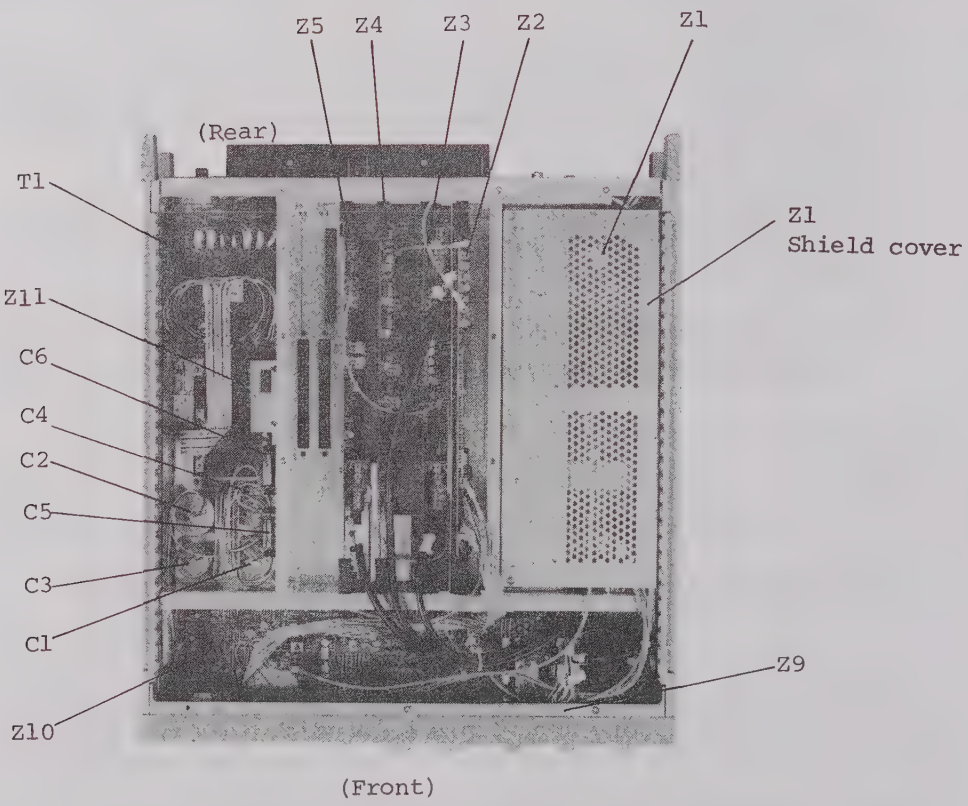


Fig. 5-2 Top View of Transmitter

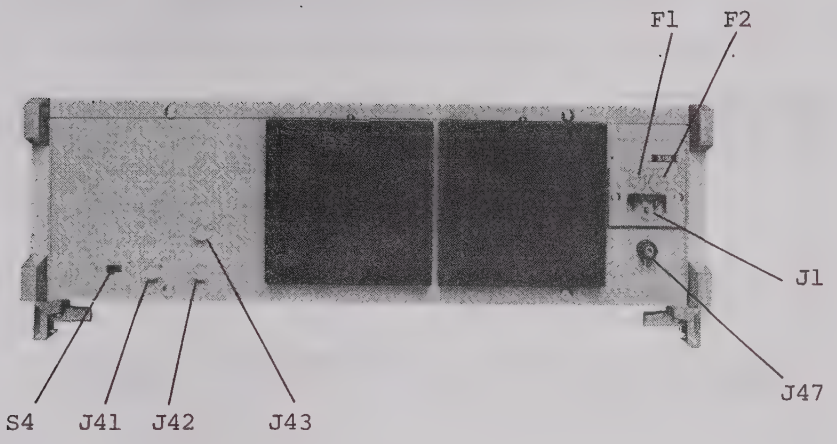


Fig. 5-3 Rear View of Transmitter

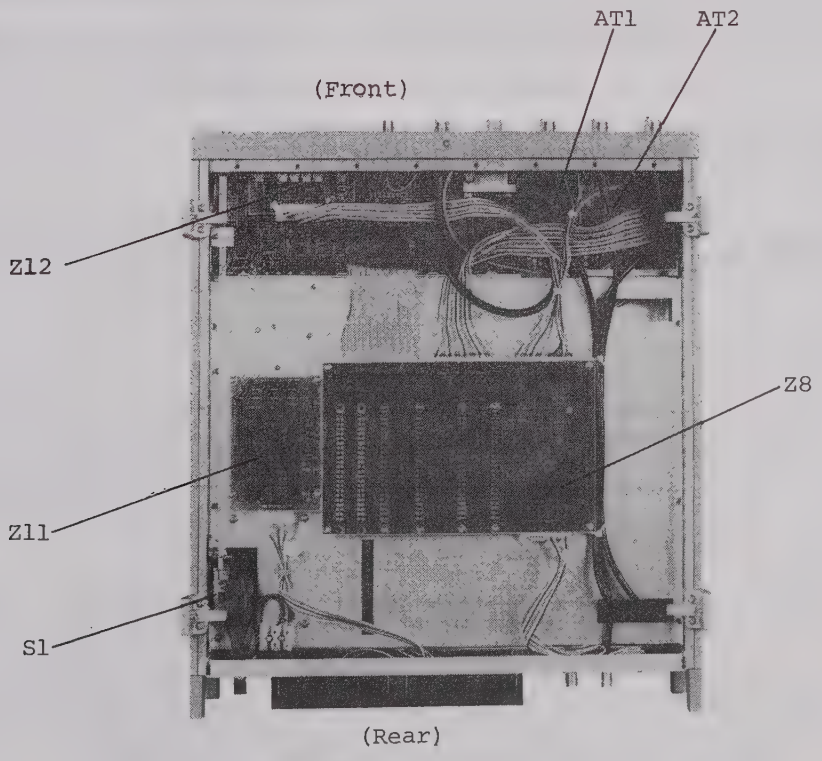


Fig. 5-4 Bottom View of Transmitter

5.2.2 Troubleshooting the Transmitter

Locate points in trouble in the following manner and check the circuit of each PC board.

(1) **No POWER ON**

Check the fuse.

Check the circuits on Z11 (see 5.2.11)

(2) **No IF OUTPUT signal**

case 1 → **AUX IF OUTPUT -10 dBm is normal**

Check the cable between IF OUTPUT LEVEL attenuator and Z1 (see 5.2.3).

case 2 → **IF OUTPUT signal and AUX IF OUTPUT signal level are abnormal**

Check the circuit on Z1 (see 5.2.3)

(3) **IF OUTPUT frequency is abnormal**

case 1 → **Sweep width is normal, but center frequency is abnormal**

Check the circuit on Z9 (see 5.2.9) and Z10 (see 5.2.10)

case 2 → **Center frequency is normal, but sweep width is abnormal**

Check the circuit on Z3 SWEEP OSCILLATOR (see 5.2.5).

case 3 → **Center frequency and sweep width are abnormal**

Check the circuits on Z2 Counter (see 5.2.4), Z10 Front board (see 5.2.10), Z1 (see 5.2.3) Oscillator and amplifier and these interface cables.

(4) **No CRYSTAL OUTPUT signal**

Check the circuit on Z5 crystal oscillator and BB sweeper (see 5.2.7).

(5) No BB OUTPUT signal or abnormal

Check the circuits on Z10 Front board (see 5.2.10), Z3 Sweep oscillator (see 5.2.5), Z4 BB oscillator (see 5.2.6) and these interface cables.

(6) No Sweep signal in BB+SWEEP OUTPUT and SWEEP OUTPUT terminals

Check the circuit on Z3 (see 5.2.5) Sweep oscillator.

(7) No BB SWEEPER OUTPUT signal or abnormal

Check the circuits on Z5 Crystal oscillator and BB sweeper (see 5.2.7) and Z10 Front board (see 5.2.10).

(8) FM DEVIATION control is abnormal

case 1 → BB OUTPUT signal is normal, but Deviation is abnormal

Check the circuits on Z10 Front board (see 5.2.10) and Z1 IF Oscillator and amplifier (see 5.2.3).

case 2 → BB OUTPUT signal and Deviation are abnormal

Check the circuit on Z10 Front board (see 5.2.10), Z3 Sweep oscillator (see 5.2.5), Z4 BB oscillator (see 5.2.6) and these interface cables.

(9) No LED display

Check the circuits on Z9 LED (see 5.2.9) and Z2 Counter (see 5.2.4).

(10) IF SLOPE ADJ function doesnot operate

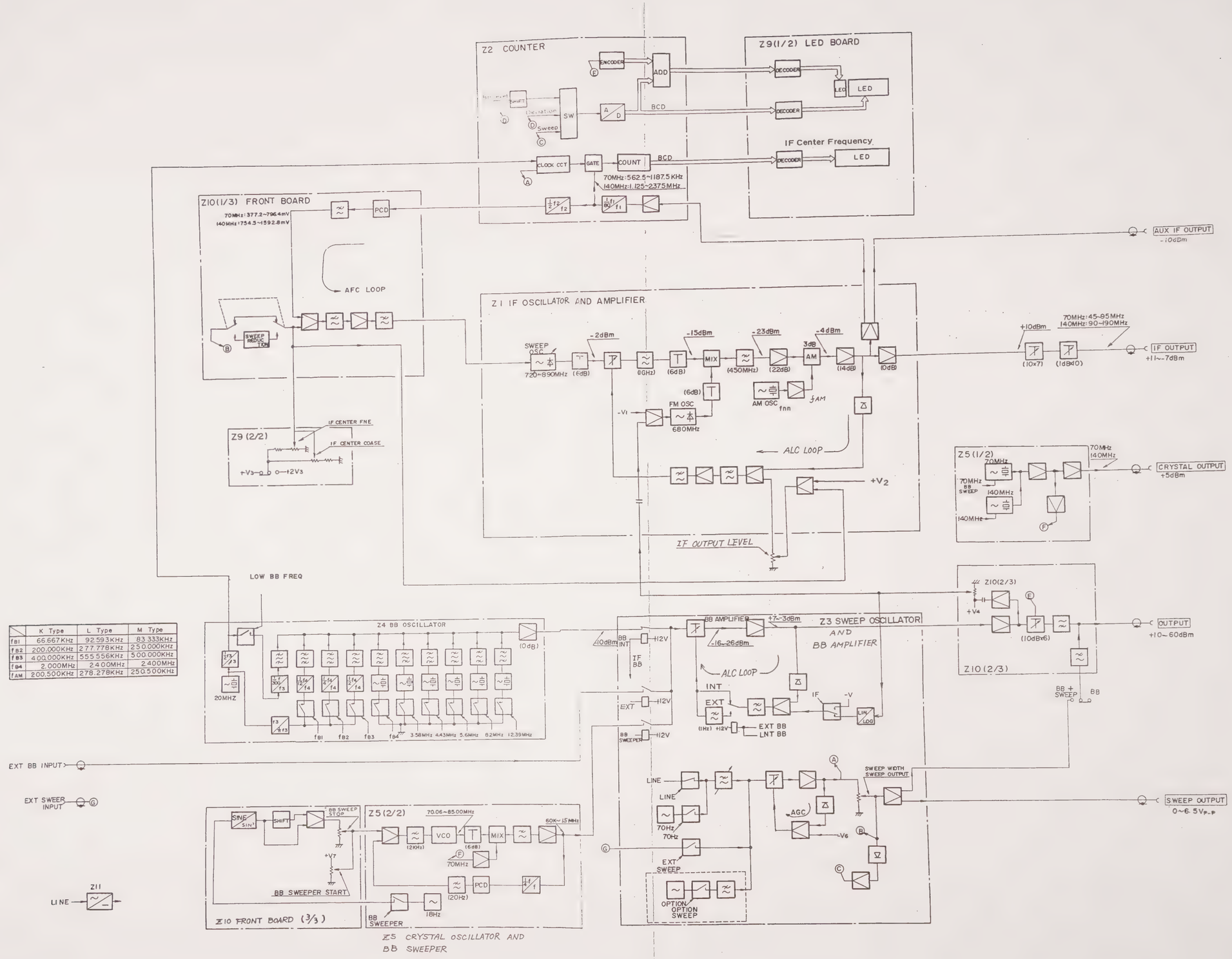
Check the circuits on Z10 Front board (see 5.2.10) and Z1 Oscillator and amplifier (see 5.2.3) and interface cables between these PC board.

(11) AM-PM ADJ control does not function

Check the circuit on Z1 IF Oscillator and amplifier (see 5.2.3).

(12) SWEEP REDUCTION function does not operate

Check the circuit on Z10 Front board (see 5.2.10)



	K Type	L Type	M Type
fB1	66.667KHz	92.593KHz	83.333KHz
fB2	200.000KHz	277.778KHz	250.000KHz
fB3	400.000KHz	555.556KHz	500.000KHz
fB4	2.000MHz	2.400MHz	2.400MHz
fAM	200.500KHz	278.278KHz	250.500KHz

Fig. 5-5 BLOCK DIAGRAM OF TRANSMITTER

NOTE

AC * * V	CONNECTION	
100~108V	1 to 5	a to (2 to 6)
108~117V	1 to 5	a to (3 to 7)
117~127V	1 to 5	a to (4 to 8)
200~216V	2 to 5	a to 6
216~234V	3 to 5	a to 7
234~254V	4 to 5	a to 8

J1 J47 F1 ***A F2 ***A Z13 ZMB2203-13 R4 1M T1 S1 see NOTE V1 BNS-3RU-C POWER

J2 U-SB1503 (J1) 0V 21.3V 0.3A 0V 21.3V 0.1A 0V 15.3V 1.4A 0V 15.3V 0.7A 0V 8.4V 0.7A 0V 3.3A 9.9V E

Z11 POWER SUPPLY

J4 U-BA 1003 (J2) Q1 S1-3554M Q2 μPC1431H J3 U-SB1503 (J3) C5 470 C6 470 C2 4700 C3 2200 C4 2200 C1 10000 (J4) (J11)

SWEEP OUTPUT J43 from J34 EXT SWE J42 to

(BB SWEEP) (J3) J29 (J1) (J2) Z5 CRYSTAL OSCILLATOR AND BB SWEEPER Z4 BB (J3) (J5) (J4)

Z8 MOTHER BOARD (J12) DF1-15S 2.5 R24 J34 from J42 +12V to S4 to J43 (J9) J44 from

from Z2 (J6) J22 J17 (J10) (J7) (J8) S1 S2 (J3) (J3) Z10 FRONT BOARD R109 R105 S2 R56 (J2) J35 Z9 LED BOARD R36 AM-FM ADJ

AM/PM BB FREQUENCY Hz 83.3k 250k 500k 2.4M 3.58M 4.43M 5.6M 8.2M 12.39M EXT

from J33 from J33 J36 DF1-15S 2.5R24 (J1) +12V +5V -12V K1 K2 Q2 μPC151C R2 10k R1 220 Q3 TLG226 Q1 1S953 +5V S1-1 S1-2 S1-3 S1-4 S1-5 S1-6 Z12 SWITCH BOARD

BB SWEEPER FREQUENCY 0.1 TO 15MHz START STOP BB OUTPUT LEVEL dBm BB OUTPUT LEVEL dBm DEVIATION KHz

from J33 from J39 from Z10 from Z5 J3 J32 (J6) J30 SWEEP OUTPUT BB SWEEP OUTPUT BB OUTPUT CRYSTAL OUTPUT +5dBm

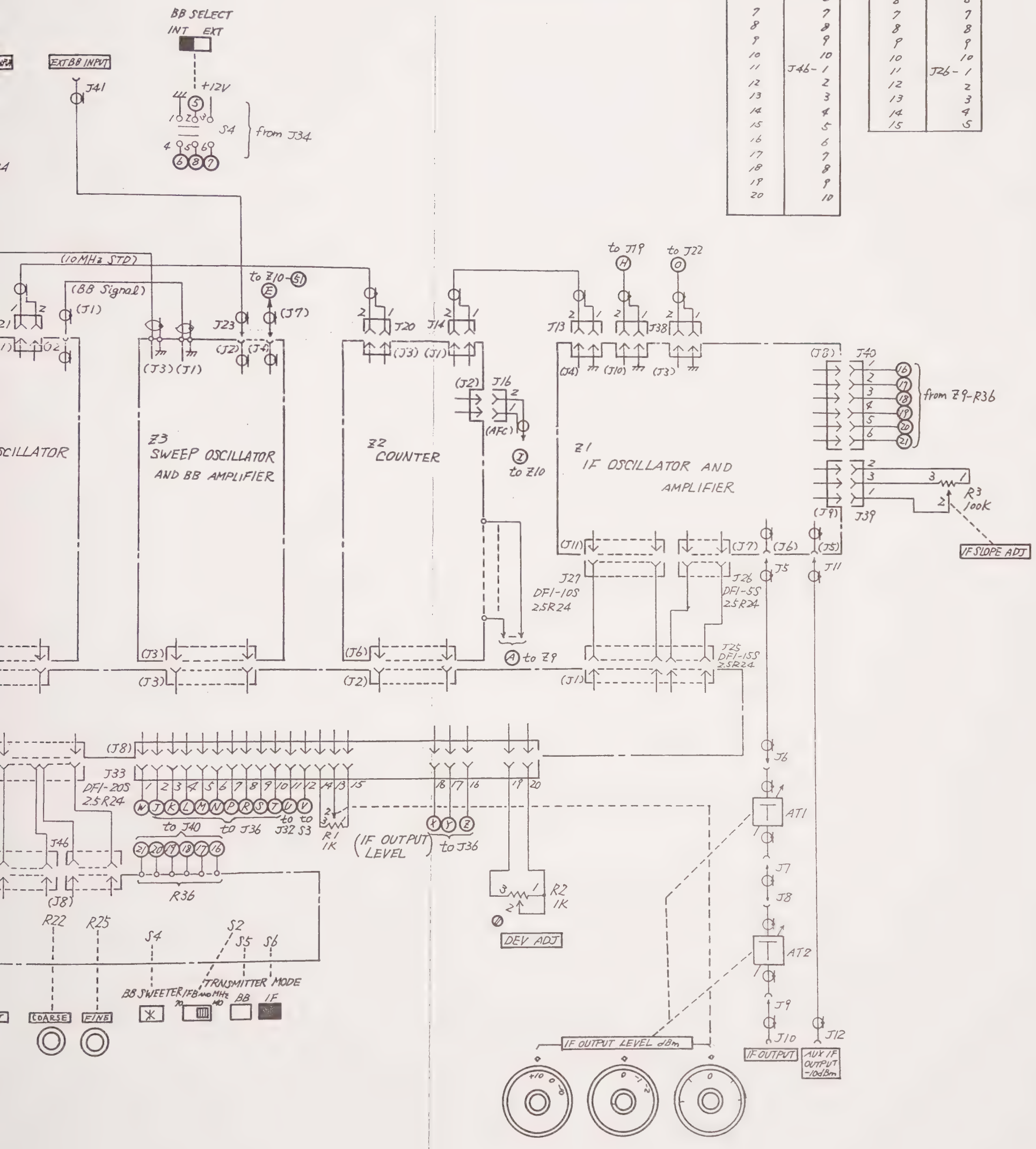
SWEEP REDUCTION AUTO EXT LINE 70Hz SWEEP FRQUENCY LOW BB FREQ (SWEEP 18Hz)

CONNECTON BETWEEN
J44 and J45 · J46

J44	J45 · J46
1	J45 - 1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	J46 - 1
12	2
13	3
14	4
15	5
16	6
17	7
18	8
19	9
20	10

CONNECTON BETWEEN
J25 and J26 · J27

J25	J26 · J27
1	J27 - 1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	J26 - 1
12	2
13	3
14	4
15	5



Component list: Table 6-1

Component list: Table 6-11 (Z12)

Fig. 5-6 CIRCUIT DIAGRAM OF ME453/
538K/L/M TRANSMITTER AND
Z12 SWITCH BOARD
(42W11120)

5.2.3 Z1 IF OSCILLATOR AND AMPLIFIER

(1) Circuit description

This circuit outputs the IF signals of 70 MHz band or 140 MHz band.

IF SIGNAL is obtained by mixing the output signal of SWEEP OSC (Q1) which is controlled by the sweep signal (J7-1 (7)) and the output signal of the FM OSC which is FM modulated by the BB signal (J3) using the double balance mixer.

Frequencies of the SWEEP OSC and FM OSC are as follows:

Oscillator Frequency Range

	SWEEP OSC	FM OSC
70 MHz Band (45 ∿ 95 MHz)	725 ∿ 775 MHz	680 MHz
140 MHz Band (90 ∿ 190 MHz)	770 ∿ 870 MHz	680 MHz

The IF signal is amplified by the IF AMPLIFIERS (Q11 to Q24) and output to the [IF OUTPUT] terminal via the attenuator for controlling the IF LEVEL.

IF AFC LOOP is formed by sending a part of the IF SIGNAL from connector J4 to Z2 via the buffer AMP (Q23).

ALC LOOP is formed by detecting a part of the IF SIGNAL with a LEVEL DETECTOR (Q28) which has a stable DC feedback, comparing it against the reference voltage (J7-2 (4)), amplifying its differential voltage, and returning to the PIN diode (Q4).

AM SIGNAL is sent to the AM MODULATOR by dividing the output of the oscillator (Q32) into

1/4 via the drive circuit (Q34, Q35). When AM-PM is ON, (J11-10 (1)) = "H" level. The AM/PM ADJ is performed by returning a part of the AM signal to the FM OSC.

AM Oscillator Frequency

	Frequency
A type	802 kHz
B type	1113.112 kHz
C type	1002 kHz

AM MODULATOR switches the 3 dB (R37 to R40) and 5 dB (R41 to R44) attenuators using the diode switches (Q13 through Q20).

IF SLOPE ADJ is performed by varying the amplitude of the sweep signal of the reference voltage (J7-2 (4)) for the ALC LOOP.

(2) Repair

1. IF OUTPUT Signal level is abnormal

Disconnect Z10-J1 from Z8-J10.
Ground C33.

case 1 → IF AMPLIFIER is abnormal

Check the levels of ❶ to ❺.

case 2 → DETECTOR AMPLIFIER is abnormal

Ground (d) and, if abnormal, check DETECTOR AMPLIFIER.

case 3 → IF AFC Loop is abnormal

See (3) in paragraph 5.2.2.

2. **IF OUTPUT Signal Frequency is abnormal**

Disconnect Z10-J1 from Z8-J10.

Ground C33.

case 1 — **IF AMPLIFIER is abnormal**

Check the level of ❻ .

case 2 — **IF AFC LOOP is abnormal**

Check the 1/160 DIVIDER circuit on Z2 and the P.C.D. circuit on Z10.

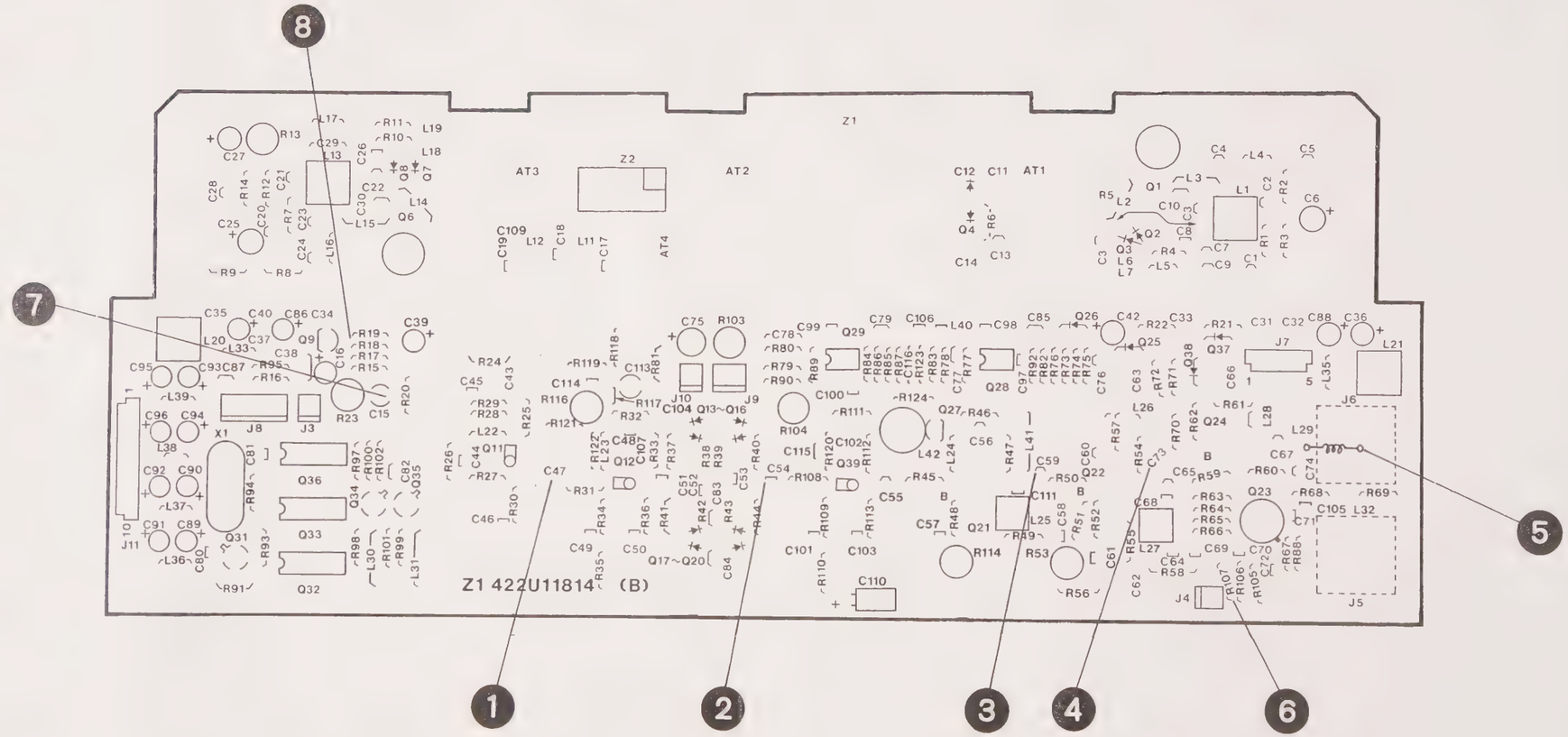
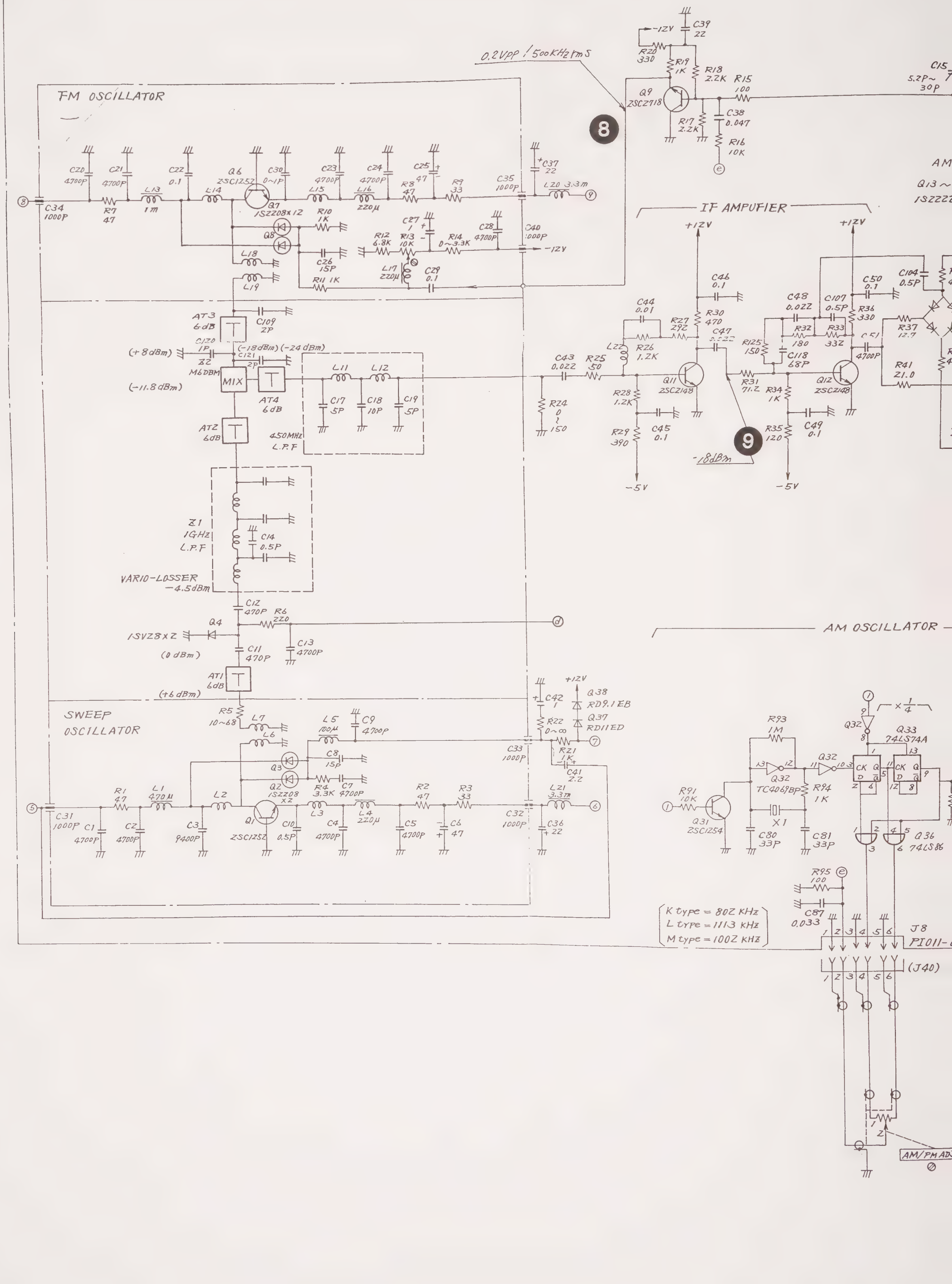
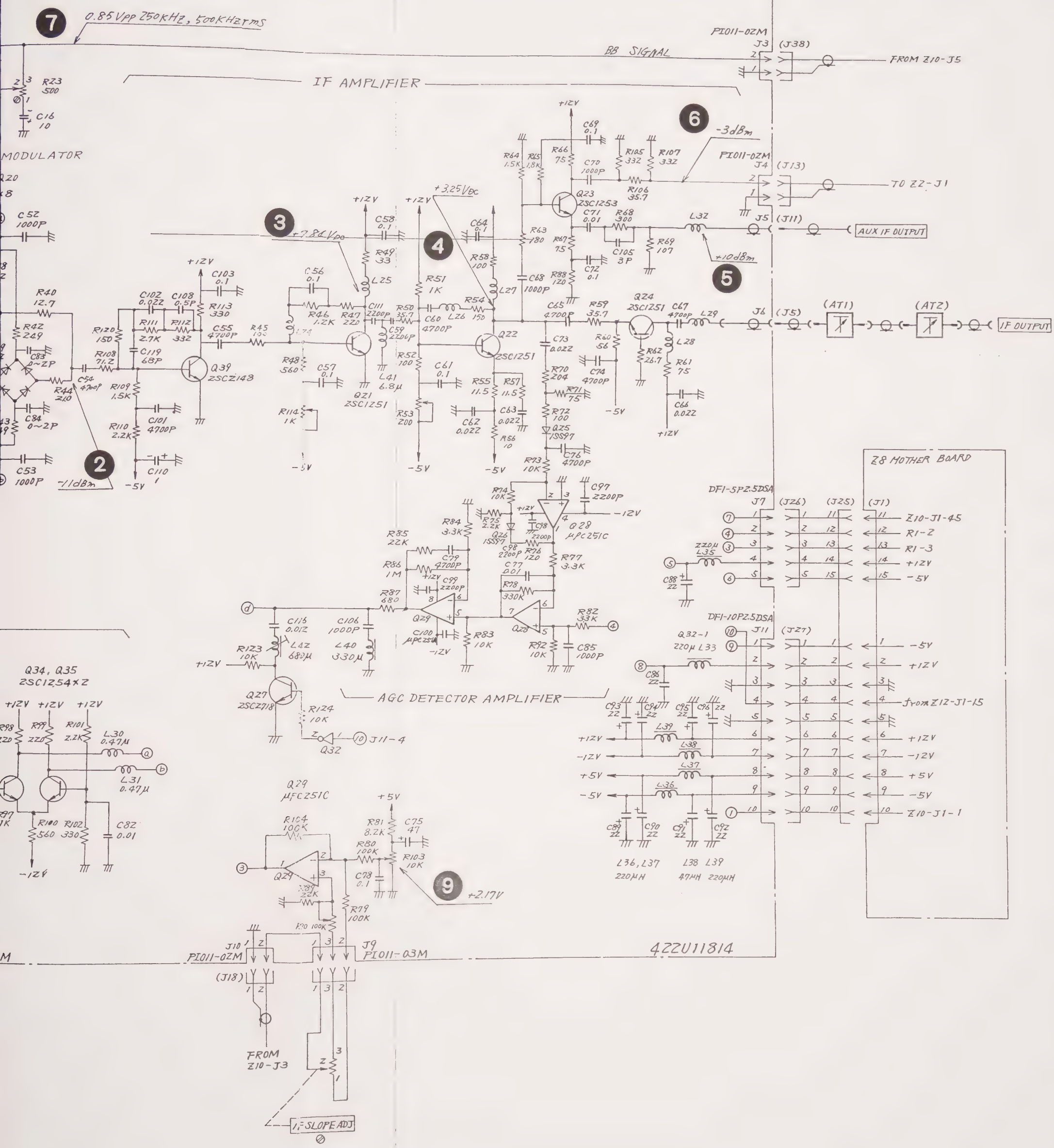


Fig. 5-7 Component Location of Z1


FM OSCILLATOR
0.2VPP / 500KHz rms
8
9
IF AMPLIFIER
AM OSCILLATOR
SWEEP OSCILLATOR
VARIO-LOSSER −4.5dBm
(+8dBm)
(−11.8dBm)
(0 dBm)
(+6dBm)
(−18dBm) (−24dBm)
M6DBM
450MHz L.P.F
1GHz L.P.F
−18dBm
+12V
−12V
−5V
K type = 802 KHz
L type = 1113 KHz
M type = 1002 KHz
(J40)
AM/PM ADJ



Component list: Table 6-2

Fig. 5-8 CIRCUIT DIAGRAM OF Z1 IF OSCILLATOR AND AMPLIFIER (TRANSMITTER) (42W11121)

5.2.4 Z2 COUNTER

(1) Circuit description

This circuit consists of a circuit for counting the center frequency of the IF signal and a circuit for displaying BB level, sweep level, FM deviation, and sweep width.

IF SWEEP SIGNAL frequency is displayed with high accuracy using the following measuring methods: For the reasons given below, it is not easy to introduce the frequency counter for displaying the center frequency of the sweep frequency generator and, therefore, the frequency was set with a dial in the past:

1) Since the frequency varies during the gate time of the counter, the center frequency is not necessarily be counted. A long gate time is required for displaying the center frequency as the average value of all sweep frequency ranges, which poses a problem in response. It is almost impractical in the case of sweep by low frequency.

2) The center frequency as an average value may be displayed quickly when an integer multiple of the sweep repetition cycle and the gate time of the counter are accurately coincide with each other.

   In such case, however, the sweep frequencies are limited. Therefore, this method is insignificant where the sweep frequency is to be set freely. This equipment has overcome the above mentioned problems by employing the below described methods which enables the center frequency to be displayed on the counter quickly and accurately.

If the sweep frequency is a symmetrical wave as shown in Fig. A and if the positive and negative half-waves form a symmetrical wave for T/4 and 3T/4, the sweep frequency $\omega(t)$ may be expressed by formula (1).

$$\omega(t) = \omega_0 + \Delta\omega_1 \sin pt + \Delta\omega_3 \sin 3pt + \ldots \quad (1)$$

In formula (1), ω_0 represents the center frequency and p represents the sweep frequency. If the gate time of the counter is ΔT in this case, the frequency is counted from time t_1 to time $t_1 + \Delta T/2$ at first. Then, the frequency from time $(2n + 1)T/2 + t_1$ to time $(2n + 1)T/2 + t_1 + \Delta T/2$ is counted (Fig. B). When the both counted values are added and displayed, the displayed frequency ω_1 may be expressed by formula (2).

$$\omega_1 = \frac{1}{\Delta T}\left\{\int_{t_1}^{t_1+\frac{\Delta T}{2}} \omega(t)\,dt + \int_{(2n-1)\frac{T}{2}+t_1}^{(2n-1)\frac{T}{2}+t_1+\frac{\Delta T}{2}} \omega(t)\,dt\right\} \quad \ldots\ (2)$$

By substituting formula (1) for formula (2) and placing $p = 2\pi/T$, $\omega_1 = \omega_0$ can be obtained. This means that the center frequency can be displayed accurately by aligning a certain time of the sweep signal and the time $(2n + 1)T/2$ time later with the gate time of the counter and by displaying the total of both. In practice, however, the sine wave is used as the sweep signal and the zero cross point of the sweep signal is used as the reference of the gate timing. That is, $\omega(t) = \omega_0 + \Delta\omega_1 \sin pt$ in formula (2) and the equipment is operated at $t_1 = 0$.

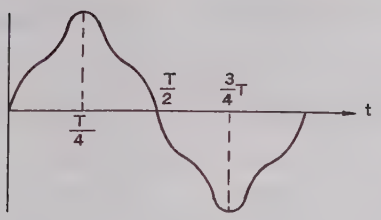


Fig. A Sweep Signal

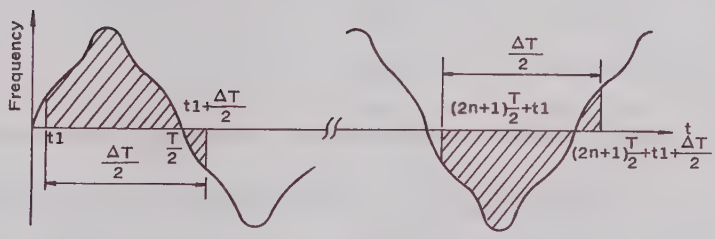


Fig. B Counter gate timing

FM DEVIATION is displayed by A/D converting (Q46) the dc voltage ⑥ that is set with the FM DEVIATION dial (Z10) and sending it to the Z9 LED board.

IF SWEEP WIDTH is displayed by A/D converting (Q46) the signal ⑦ for displaying the sweep width that is sent from Z3 and sending it to the Z9 LED board.

BB OUTPUT LEVEL is displayed by A/D converting (Q46) the dc voltage ⑧ proportional to the continuous variable dial of 0 to -10 dB, adding it to the value of the 10 dB step attenuator, and sending it to the Z9 LED board. Relationship between BB OUTPUT LEVEL at the point of Q44-7 ⑧ and dc voltage is shown in the table below.

Table A BB Level of A/D converter

	BB PUTPUT LEVEL	Voltage at Q44-7 ❽
①	+10 dBm ∿ 0 dBm	+1.00 ∿ 0.00 V
②	0 dBm ∿ -10 dBm	0.00 ∿ -1.00 V
③	-10 dBm ∿ -20 dBm -20 dBm ∿ -30 dBm -30 dBm ∿ -40 dBm -40 dBm ∿ -50 dBm -50 dBm ∿ -60 dBm	-1.00 ∿ -1.99 V

SWEEP LEVEL is displayed by A/D converting (Q6) the signal ❼ for displaying the sweep level that is sent from Z3 and sending it to the Z9 LED board.

A/D converter constantly measures two functions on the timesharing basis, which is combined as shown in Table B.

Table B A/D converter

	Name	A/D input level
IF BAND	FM DEVIATION	0 ∿ 1 V/0 ∿ 1000 kHz rms
	SWEEP WIDTH	0 ∿ 0.5 V/0 ∿ ±50 MHz
BB BAND	BB OUTPUT LEVEL	See Table A
	SWEEP LEVEL	0 ∿ 0.65 V/0 ∿ 6.5 V

(2) Repair

1. **IF OUTPUT Signal Frequency is abnormal**

Apply the 70 MHz single to J1.

case 1 → **1/160 DIVIDER is abnormal**

Check the waveforms of ❷ to ❹.
(The period of ❷ is equal to that of ❹.)

Check the output frequency of J2.

case 2 → **IF AFC Loop is abnormal**

Check the P.C.D. circuit on Z10.

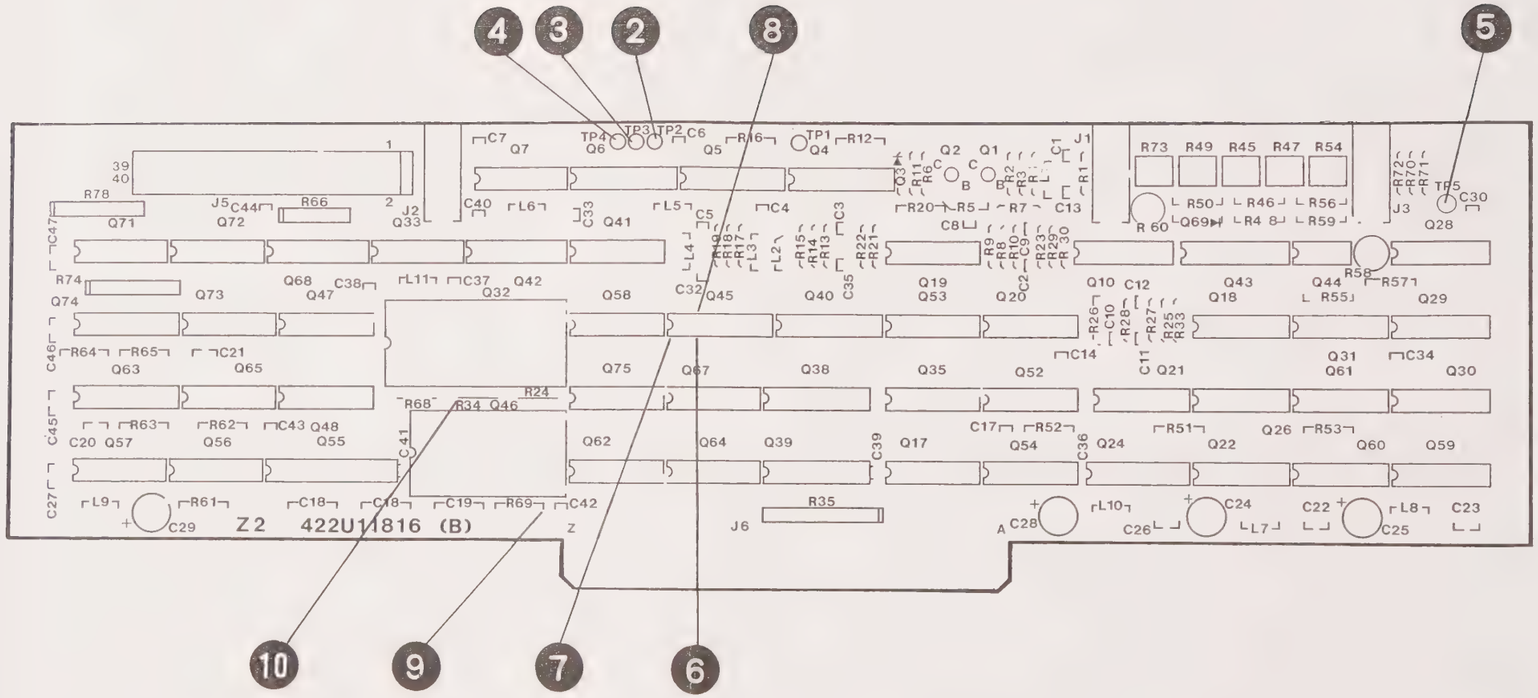


Fig. 5-9 Component Location Z2

1/160 DIVIDER

FROM Z1-J4 J1

FROM Z1-J4

C1 4700P, R2 22, R1 75, R3 1.8K, R4 4.7K, R5 68, R6 68, R7 470, C2 4700P, R8 1.8K, R9 10, R10 4.7K, R11 10K, Q1 2SC2148, Q2 2SC2148, Q3 1S953, C13 4700P, L1 100μ, C30 0.1, -12V

C3 4700P, L2 220μ, C35 0.1, R12 510, R13 510, R14 510, R15 510, TP1

C4 4700P, L3 220μ, R16 510, R17 510, R18 510, R19 510

C32 0.1, C5 4700P, L4 220μ, C6 4700P, L5 220μ, C33 0.1, C7 4700P, L6 220μ

-5V, +5V

Q4 HD10231, Q5 HD10131, Q6 HD10125, Q7 74LS290

GATE TIME CCT

Q62 74LS00, Q75 74LS02, Q64 74LS74A, Q17 74LS08, Q53

C8 470P, RZ1 2.2K, RZ2 3.3K, Q19 74L874A, RZ0 1K, RZ3 1K, QZ0

C9 47P

Q58 74LS08, RZ4 4.7K, RZ5 4.7K, Q21 74LS74A, Q10 74LS00, RZ6 1K, C10 4700P, RZ7 1K, C11 0.01, C12 1000P, Q20 74LS14, RZ8 1K

RZ9 3.3K, C14 100P, R30 4.7K, QZZ 74LS74A, QZ4 74LS75, C36 0.1

Q26, C34 0.1

J3 FROM Z4-J1

Q18 74LS02, Q28 74LS290, Q31 74LS08, Q29 74LS290, Q30 74LS290, Q59 74LS290, Q60 74LS290, Q61 74LS290

DC SHIFT CCT

BB OUTPUT LEVEL DISPLAY ADJ

R54 10dB RANGE ADJ 20K, R56 10K, R53 22K, R55 10K, Q44 μPC251C, R57 10K, R58 20K

±10~0dBm ADJ, R70 4.22K, R45 1K, R46 2.21K, Q43 TC4053BP

0~-10dBm ADJ, R71 4.02K, R47 1K, R48 3.24K

-10~-20dBm Less ADJ, R72 3.24K, R49 1K, R50 3.65K

Q35, Q53 74LS02, Q52 74LS08, Q54, R51 4.7K, R52 1K, C17 100P

Q NO.	+5V	EARTH
Q17, Q18, Q20, QZ2, QZ6, Q31 Q33, Q35, Q41, Q52~Q54, Q57 Q58, Q62, Q65, Q67, Q71~Q73, Q75	14	7
Q63	16	8
Q74	5	12

A/D CONVERTER

BB LEVEL

+6.2V, +12V, R59 680, Q69 1S252, R60 10K (+200V)

Q45 TC4053BP, R68 1M, R61 150K, C18 0.2, C19 0.1, C41 0.1, C42 0.1, R69 100K

Q45 74LS08, FM, R73 5K

SWEEP SIG 250mV/25MHz

J6-16

VAG, Vref (+200V), VX, R1, R/C1, C1, C01, C02 DS, VSS DS, VEE DS, VDD, CIK1 CIK

TRF, MR, REXT, CA4, SIN, INI, INZ, BC VDD Vss

COUNTE

DOUT, COUT, BOUT, AOUT, T1, T2, T3, T4, T5

Q58 74LS08, RZ4 4.7K, Q10 74LS00, RZ6 1K, C10 4700P, RZ7 1K, C11 0.01, C12 1000P, Q20 74LS14, RZ8 1K

RZ9 3.3K, C14 100P, R30 4.7K, QZZ 74LS74A, QZ4 74LS75, C36 0.1

Q31, Q18, R33 4.7K, +5V

---

6 1.0V/1000KHzrms

9 H: 5μsec/DIV V: 2V/DIV

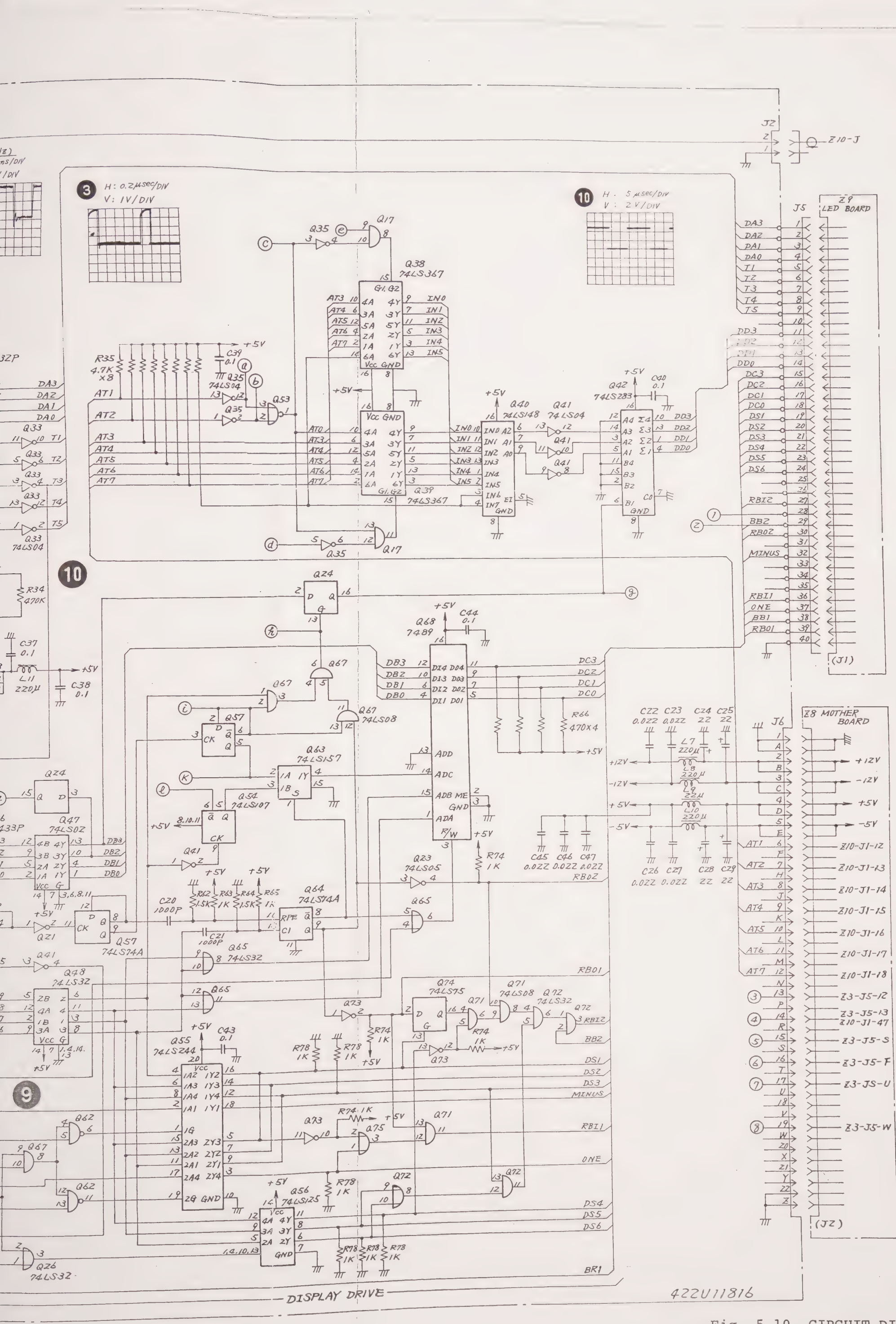


Fig. 5-10 CIRCUIT DIAGRAM OF Z2 COUNTER (TRANSMITTER) (42W11122)

Component list: Table 6-3

5.2.5 Z3 SWEEP OSCILLATOR AND BB AMPLIFIER

(1) Circuit description

This circuit consists of the ALC circuit for stabilizing the level of the BB signal and a circuit for generating the SWEEP signals.

BB ALC circuit consists of the variable attenuator (Q1), BB AMPLIFIERS (Q2 to Q3 and Q7 to Q8), dc feedback type detector (Q11), and dc signal comparator (Q11).

BB OUTPUT LEVEL is controlled through the LOGARITHM AMPLIFIERS (Q12 to Q14) using the dc voltage ⑧ set by the BB OUTPUT LEVEL dial as the reference voltage of the ALC circuit.

SWEEP CIRCUIT consists of the SWEEP OSCILLATOR, BAND PASS FILTER (Q29), SWEEP AGC circuit (Q39 through Q41, Q59), and SWEEP OUTPUT AMP (Q47 through Q53).

SWEEP LEVEL DETECTOR (Q54) is used to detect the SWEEP signal set with the SWEEP OUTPUT/SWEEP WIDTH dial, send it to Z2 COUNTER, and display SWEEP OUTPUT and SWEEP WIDTH.

COUNTER TIMING CIRCUIT (Q39, Q46) is the circuit for generating the trigger pulse from the SWEEP signal when counting the IF center frequency, which consists of a circuit (Q39) for converting the waveform of the SWEEP signal to a square wave and a frequency divider (Q46).

(2) Repair

1. No Sweep signal at BB+SWEEP OUTPUT and SWEEP OUTPUT terminals

Apply the 40 Hz, 2 Vp-p signal to EXT SWEEP INPUT (rear panel).

case 1 → EXT SWEEP is normal

Check the frequencies and levels at R70 and ❷ .

case 2 → SWEEP AGC and SWEEP OUTPUT AMP are abnormal

Check the levels at ❺ , R150, and R134.

2. No BB OUTPUT signal or abnormal

Apply the 200 kHz, -10 dBm signal to J1.

case 1 → Normal, when setting TRANSMITTER MODE to IF

Check the voltages of ❶ and ❽ .

case 2 → BB AGC is abnormal

Jumper R6.

Check the levels and voltages at C7, C8, C15, and R33.

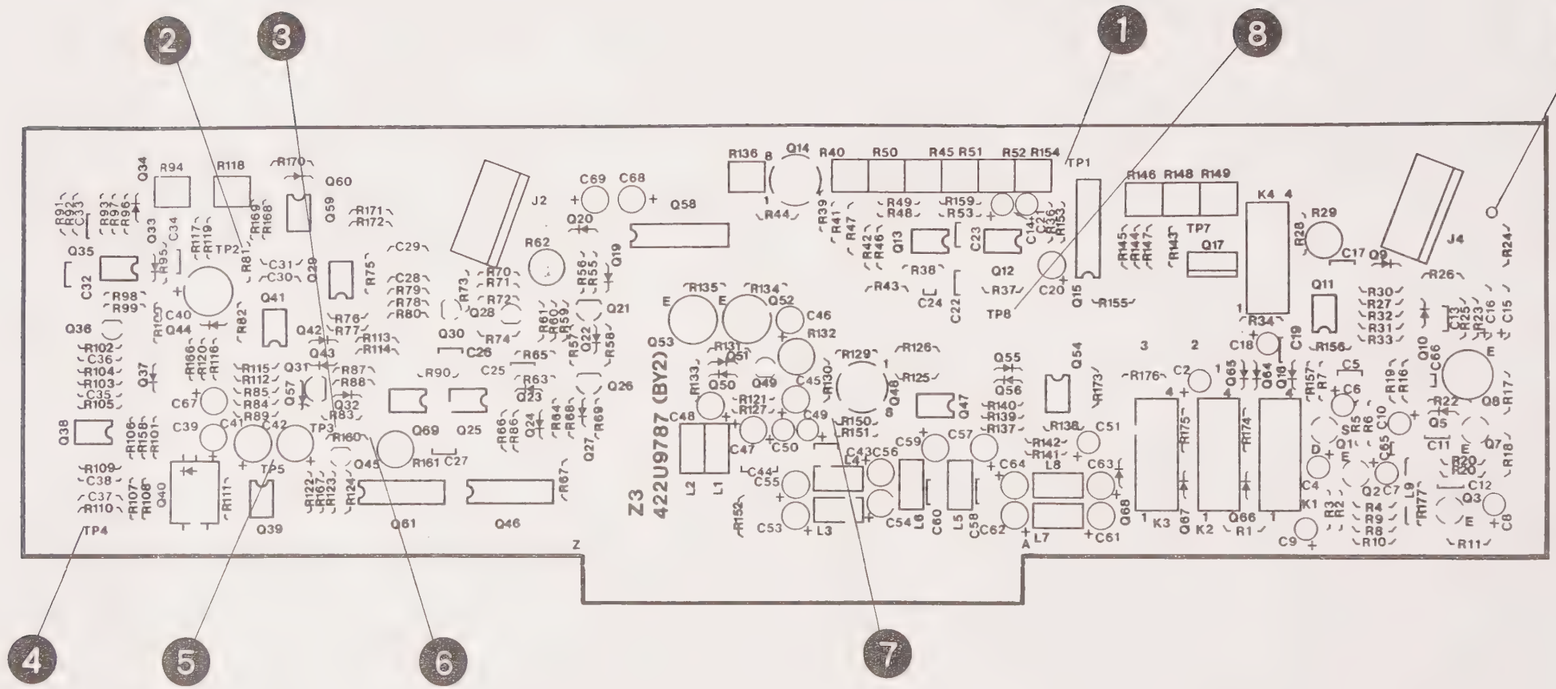
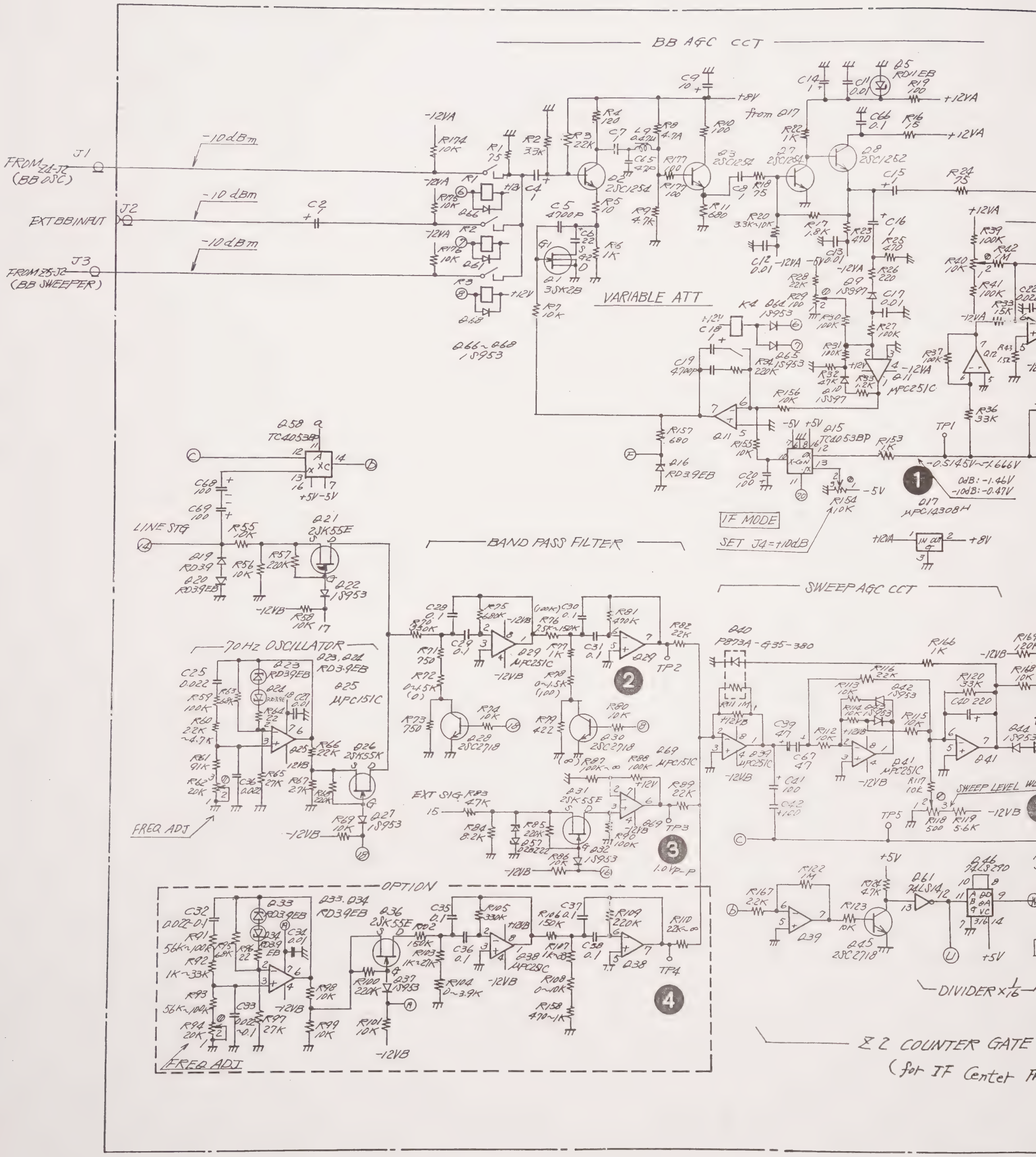
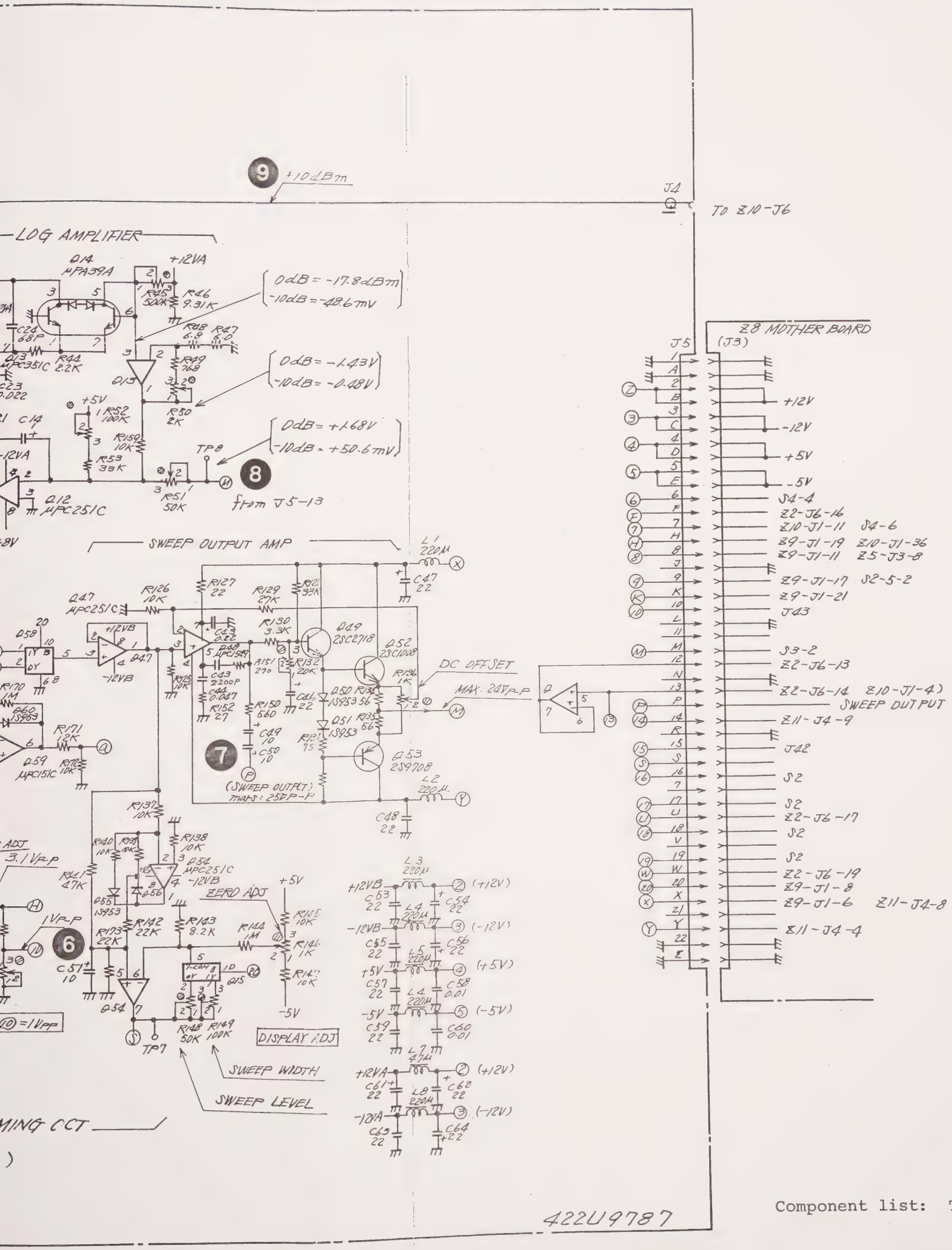


Fig. 5-11 Component Location of Z3


BB AGC CCT
J1
FROM Z4-J2 (BB OSC)
J2
EXT BB INPUT
J3
FROM Z5-J2 (BB SWEEPER)
-10dBm
-10 dBm
-10dBm
-12VA
+8V
from Q17
+12VA
VARIABLE ATT
Q66~Q68 1S953
IF MODE
SET J4=+10dB
-0.5145V~-1.666V
0dB: -1.46V
-10dB: -0.47V
Q17 μPC1430BH
LINE STG
70Hz OSCILLATOR
FREQ ADJ
BAND PASS FILTER
EXT SIG
TP2
TP3
1.0Vp-p
SWEEP AGC CCT
SWEEP LEVEL
TP5
DIVIDER ×1/16
OPTION
FREQ ADJ
(for IF Center F



Component list: Table 6-4

Fig. 5-12 CIRCUIT DIAGRAM OF Z3 SWEEP OSCILLATOR AND BB AMPLIFIER (TRANSMITTER (42W11123)

5.2.6 Z4 BB OSCILLATOR

(1) Circuit description

This circuit generates the BB signals.

BB LOW FREQ is generated by dividing the output signal of the 20 MHz crystal oscillator (X8, Q19) and removing the higher harmonic with a band pass filter. The dividing ratio is as shown below.

BB Low Frequency

Model	BB Frequency	Frequency at ⑫	Frequency divider
K type	66.667 kHz	800 kHz ($\times \frac{1}{25}$)	$\times \frac{1}{12}$
	200 kHz		$\times \frac{1}{4}$
	400 kHz		$\times \frac{1}{2}$
L type	92.593 kHz	1111.111 kHz ($\times \frac{1}{18}$)	$\times \frac{1}{12}$
	277.778 kHz		$\times \frac{1}{4}$
	555.556 kHz		$\times \frac{1}{2}$
M type	83.333 kHz	1000 kHz ($\times \frac{1}{20}$)	$\times \frac{1}{12}$
	250 kHz		$\times \frac{1}{4}$
	500 kHz		$\times \frac{1}{2}$

(2) Repair

1. **No BB OUTPUT signal or abnormal**

case 1 → **BB High FREQ is normal**

Check the frequency and level of J1.

Select one of the three frequencies of BB Low FREQ, and check the frequencies and levels at R83, R108, and R105. (❶❷❸)

case 2 → **BB OUTPUT signal is abnormal**

Check the frequencies and levels at C78 to C84. (❹ ∿ ❾)

Check the frequency and level of J2.

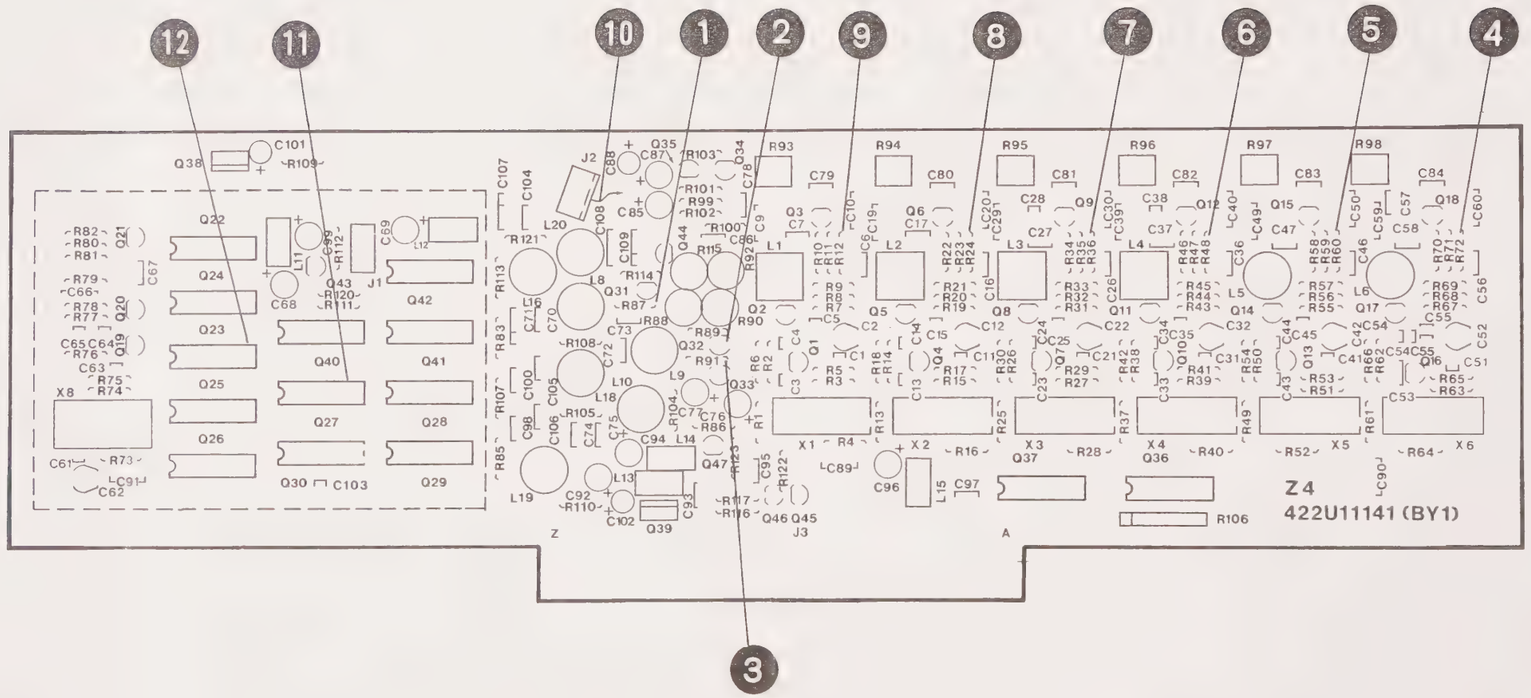


Fig. 5-13 Component Location of Z4

QZ2, QZ3	K TYPE	800KHz
QZ5	L TYPE	1.11111MHz
QZ6	M TYPE	1 MHz

Used IC	BB type	unused IC
QZ2, Q23	K TYPE	QZ5, Z6
Q25	L TYPE	QZ2, 23, Z6
QZ6	M TYPE	QZ2, 23, Z5

20MHz CRYSTAL OSCILLATOR

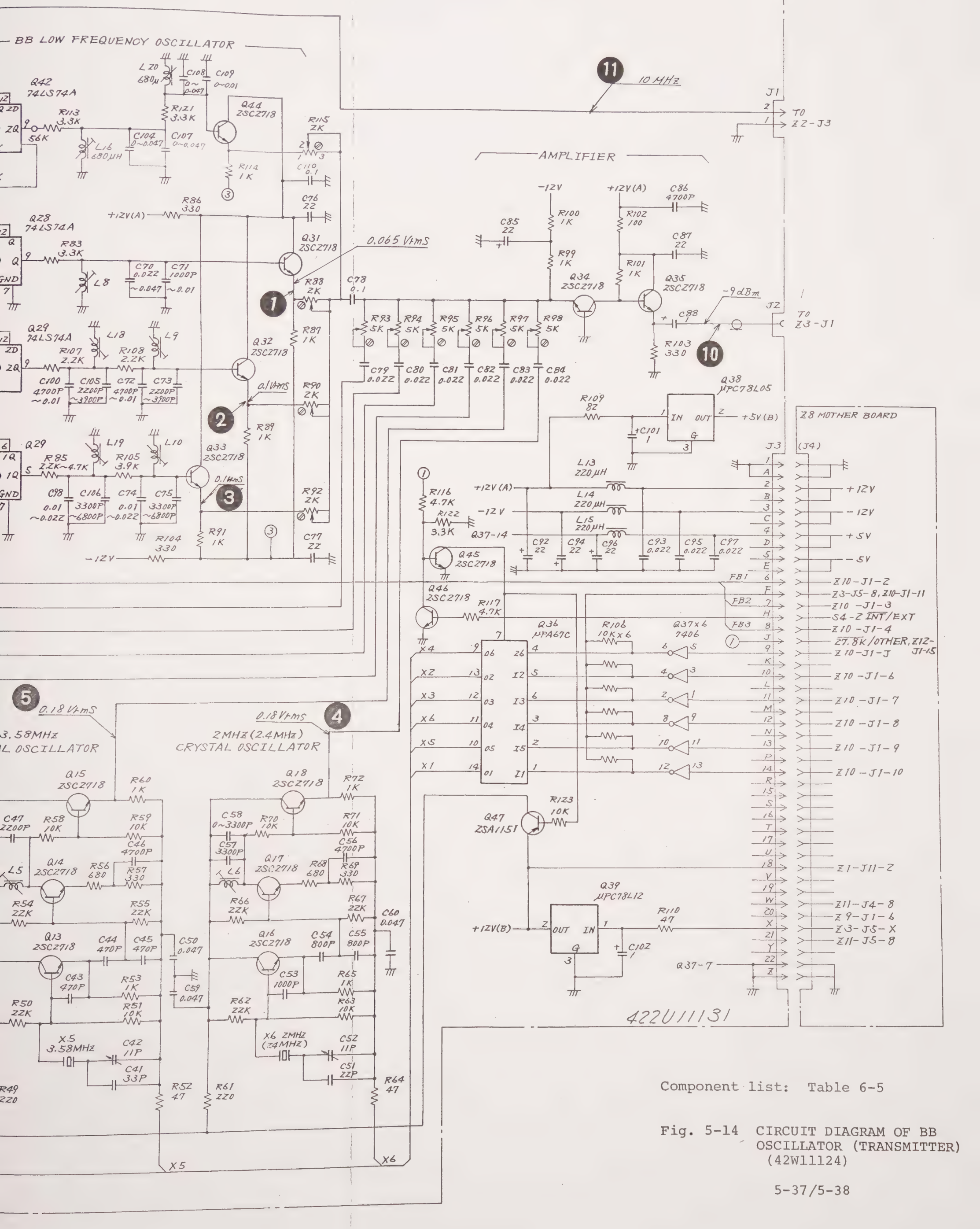
DIVIDER

9 0.3VrmS — 12.39MHz CRYSTAL OSCILLATOR

8 0.22VrmS — 8.2MHz CRYSTAL OSCILLATOR

7 0.18VrmS — 5.6MHz CRYSTAL OSCILLATOR

6 0.18VrmS — 4.43MHz CRYSTAL OSCILLATOR



Component list: Table 6-5

Fig. 5-14 CIRCUIT DIAGRAM OF BB OSCILLATOR (TRANSMITTER) (42W11124)

5.2.7 Z5 CRYSTAL OSCILLATOR AND BB SWEEPER

(1) Circuit description

This circuit consists of a 70 MHz or 140 MHz crystal oscillator and a BB sweeper.

BB SWEEPER consists of a 70 to 85 MHz VCO (Q16, Q17), mixer (Z1), BB amplifier (Q19, Q33), and PCD (Pulse Count Detector) (Q20 through Q31).

The VCO output is mixed with the 70 MHz crystal oscillator signal ⑤ , converted to the BB frequency, and sent from J2 to Z3 ALC circuit via the BB amplifier.

18 Hz OSCILLATOR is the circuit for generating the sweep signal for the BB sweeper. The waveform of the oscillator output is shaped by B.P.F (Q35) and sent to Z10 front board.

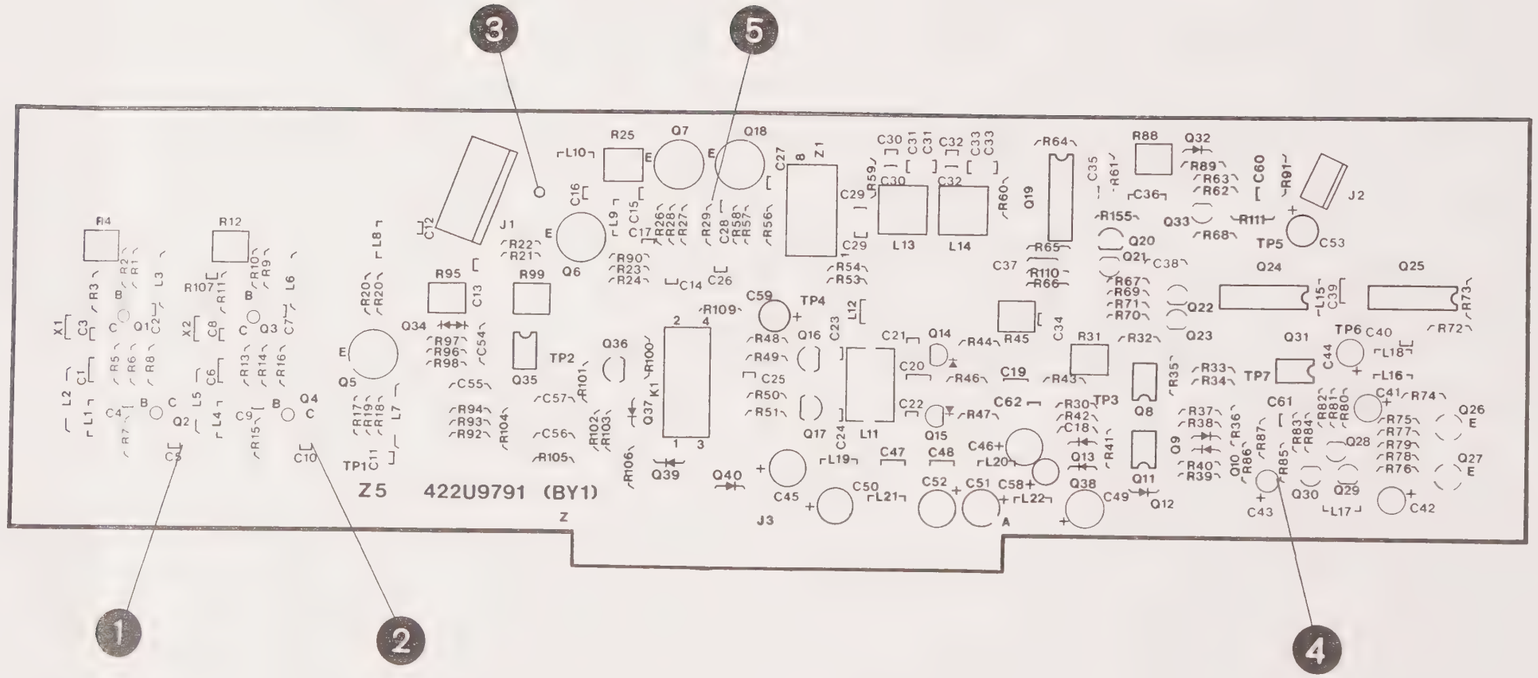
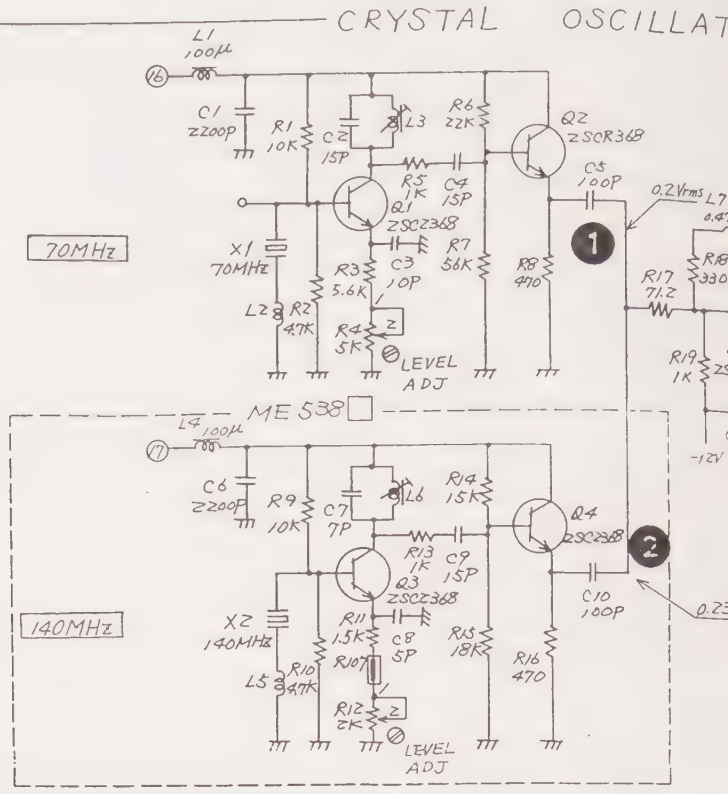


Fig. 5-15 Component Location of Z5

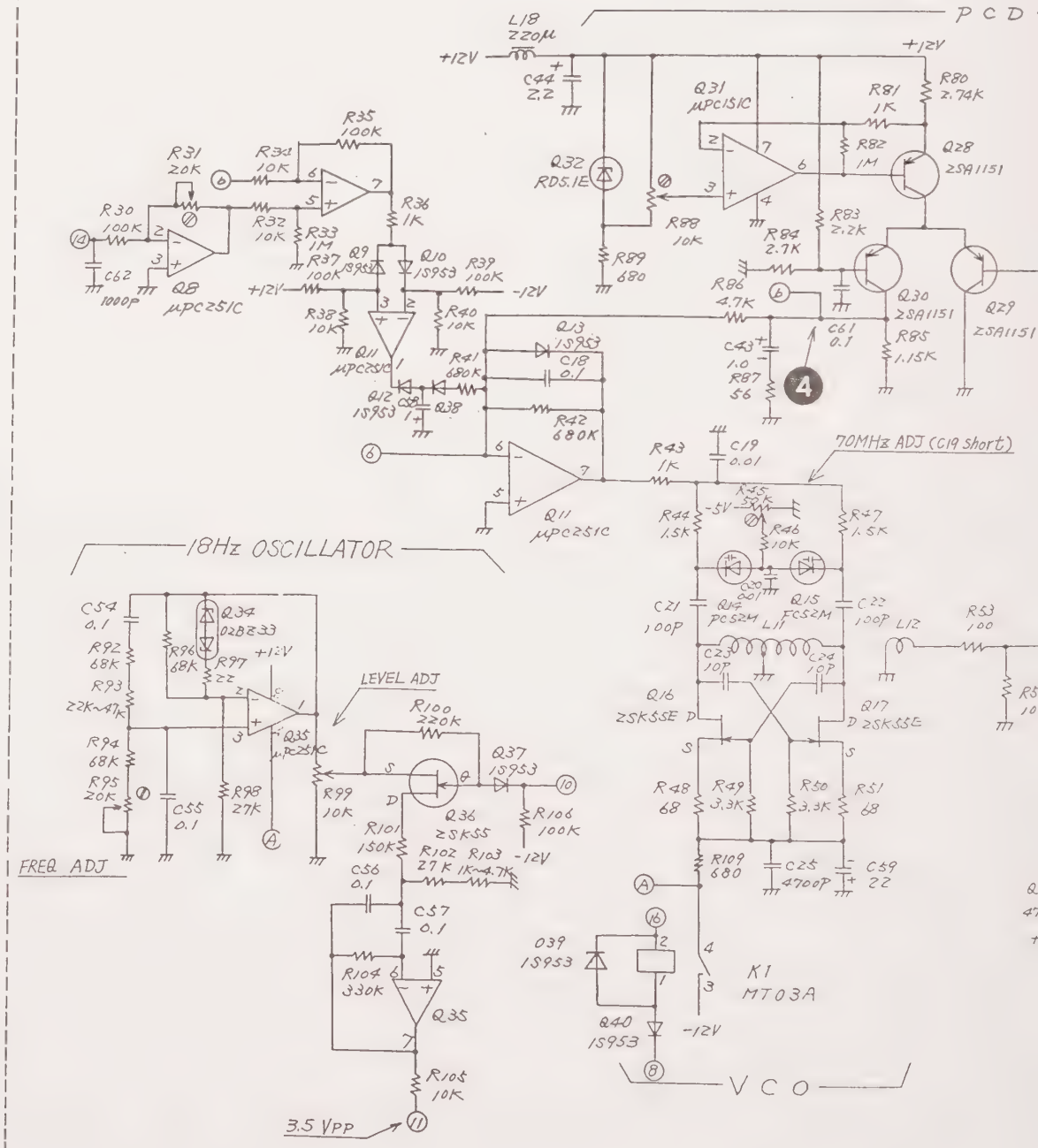
CRYSTAL OSCILLAT

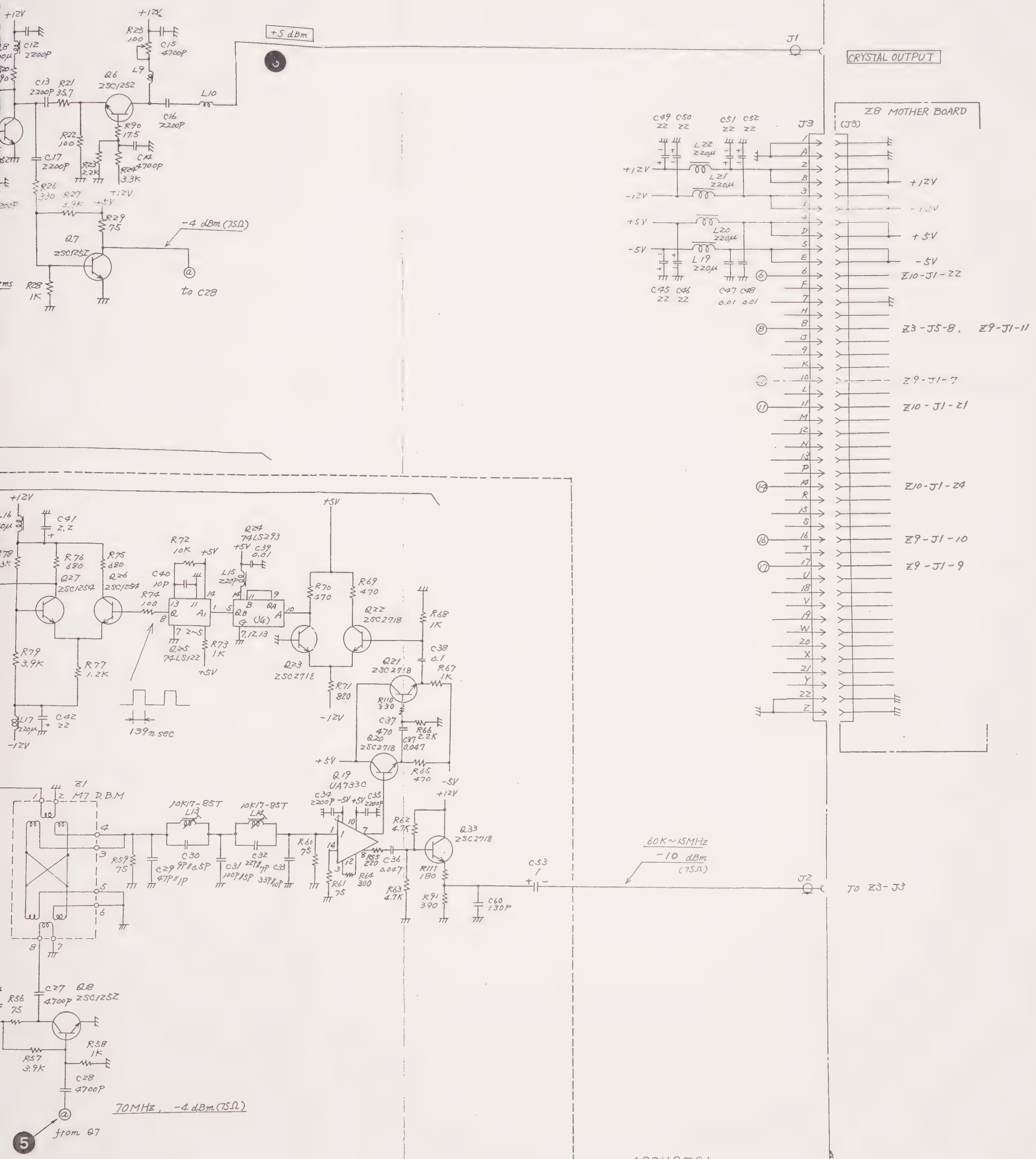


BB SWEEPER

OPTION

PCD





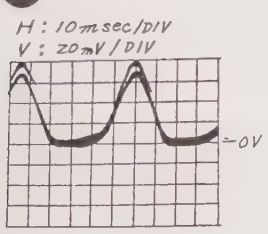


Fig. 5-16 CIRCUIT DIAGRAM OF Z5 CRYSTAL OSCILLATOR AND BB SWEEPER (TRANSMITTER)

(41W1297)

NT LIST: Table 6-6

5.2.8 Z8 MOTHER BOARD

(1) Circuit Description

This is the wiring circuit that connects the various PC boards.

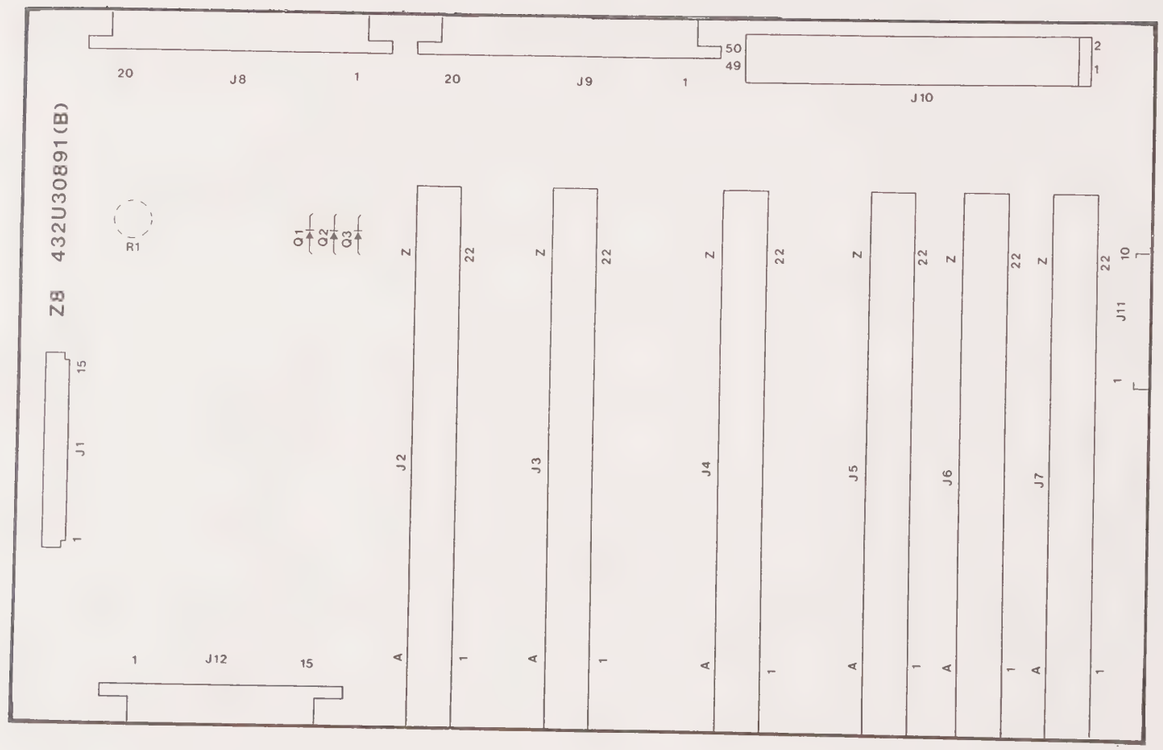


Fig. 5-17 Component Location of Z8

432U 30891

Z11

(J4)

(Z11) J11

+12V
-12V
⑦
+5V
+5V(B)
-5V
⑤ Line

(Z10) J10

Z10 (J1)

(AM/PM) A
(66.7KHz) B
(200KHz) C
(400KHz) D
(2MHz) E
(3.58MHz) F
(4.43MHz) G
(5.6MHz) H
(8.2MHz) I
(12.38MHz) J
K
(+10dBm) L
(0dBm) M
(-10dBm) N
(-20dBm) O
(-30dBm) P
(-40dBm) Q
(-500dBm) R

⑥ -5V +5V -12V +12V

J5 (Z5)

+12V
-12V
+5V
-5V
⑥
Ⓡ Ⓢ

J4 (Z4)

Ⓑ Ⓒ Ⓓ Ⓔ Ⓕ Ⓖ Ⓗ Ⓘ Ⓙ
to J1- ②

(Line Signal)

(AFC LOOP)

(FM DEVIATION DI

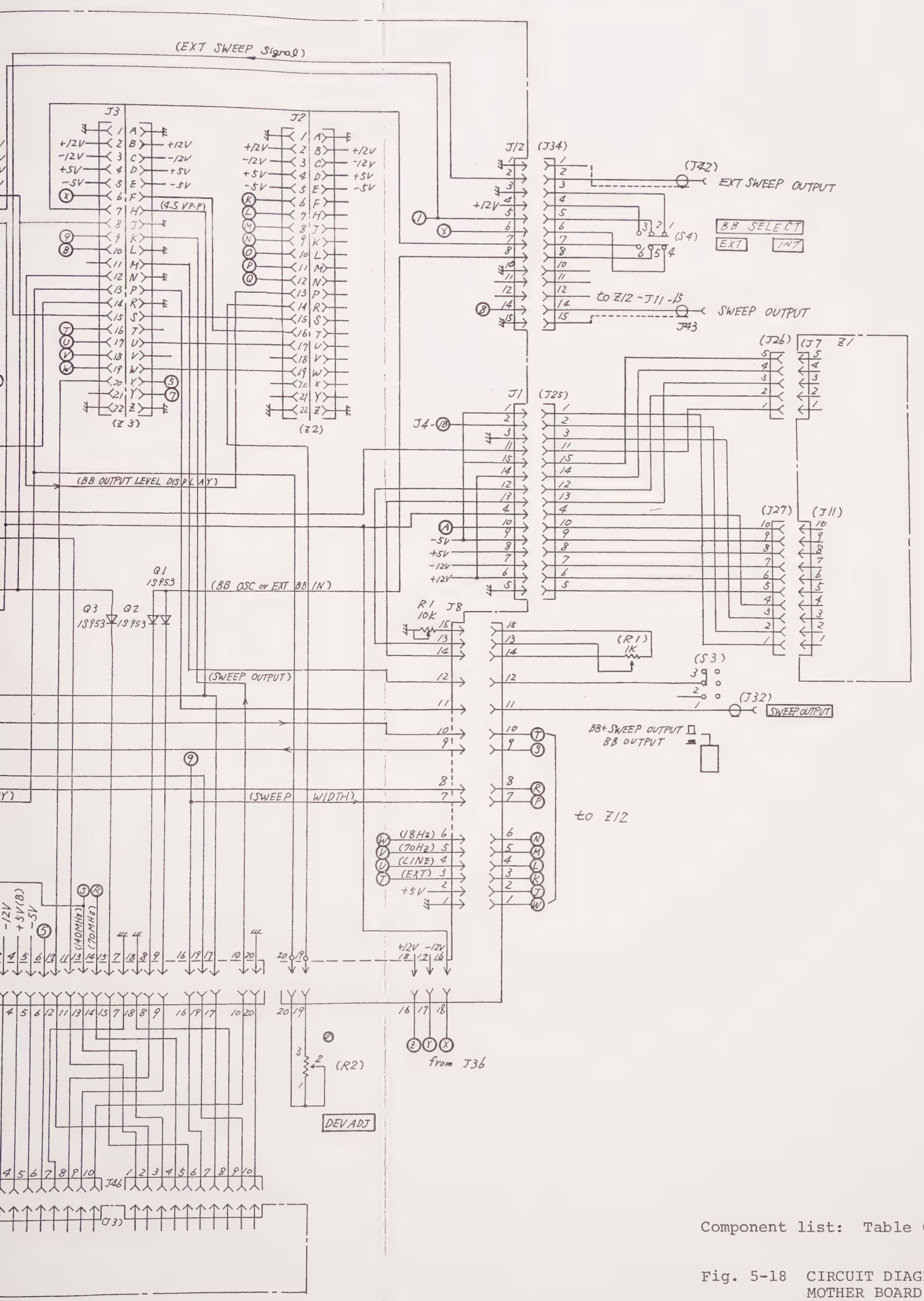
J9

(J44)

(J45)

(J2)

Z9



Component list: Table 6-7

Fig. 5-18 CIRCUIT DIAGRAM OF Z8
MOTHER BOARD (TRANSMITTER)
(42W11126)

5.2.9 Z9 LED BOARD

(1) Circuit description

This circuit consists of the function switching circuit, display circuit, and circuit for setting IF center frequency and IF sweep width.

FM DEVIATION/BB OUTPUT LEVEL, SWEEP WIDTH/SWEEP OUTPUT is displayed by converting the display data of the BCD to 7-segment data by the decoder (Q4), adding it to anode of the LED (Q10 through Q14), and driving (Q21) the cathode with the digits signals (⑲ through ㉔).

IF CENTER FREQUENCY is displayed by converting the display data of the BCD to 7-segment data by the decoder (Q6), adding it to the anode of the LED (Q15 through Q19), and driving the cathode (Q25) with digits signals (⑤ through ⑨).

FUNCTION is selected by the SWITCH (S4 through S6) circuit, its data is latched (Q89 to Q90), and lights the LED via the driver (Q91).

IF CENTER FREQ is set by the IF AFC circuit of Z10 front board by setting the voltage by the variable resistors R22 and R25.

SWEEP WIDTH/SWEEP OUTPUT is set by adjusting the amplitude of the sweep signal using R28.

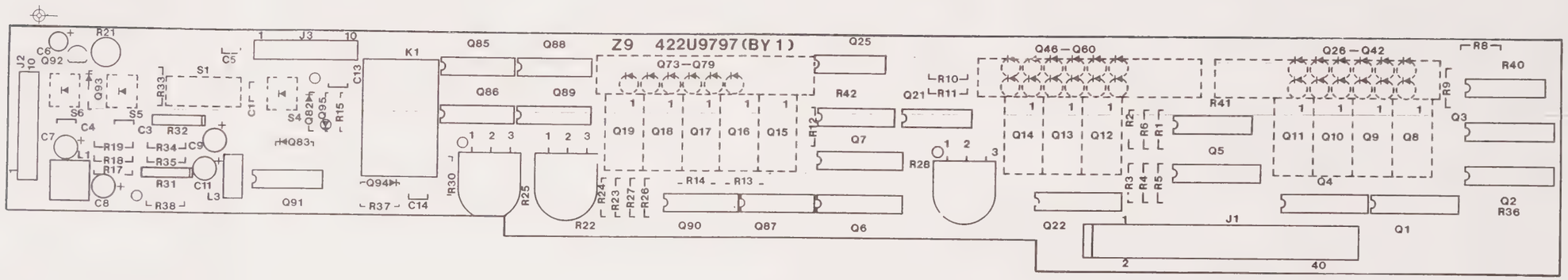
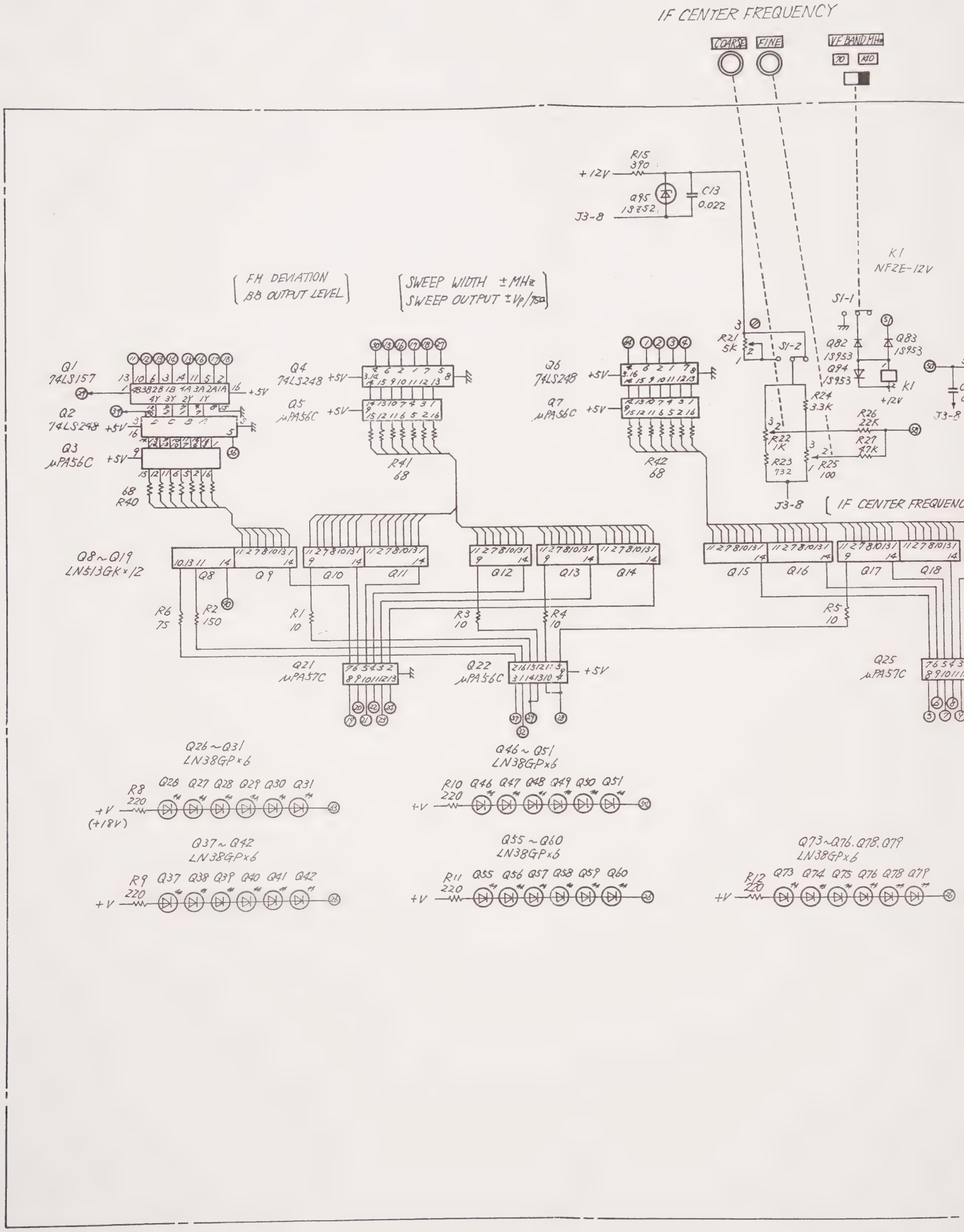
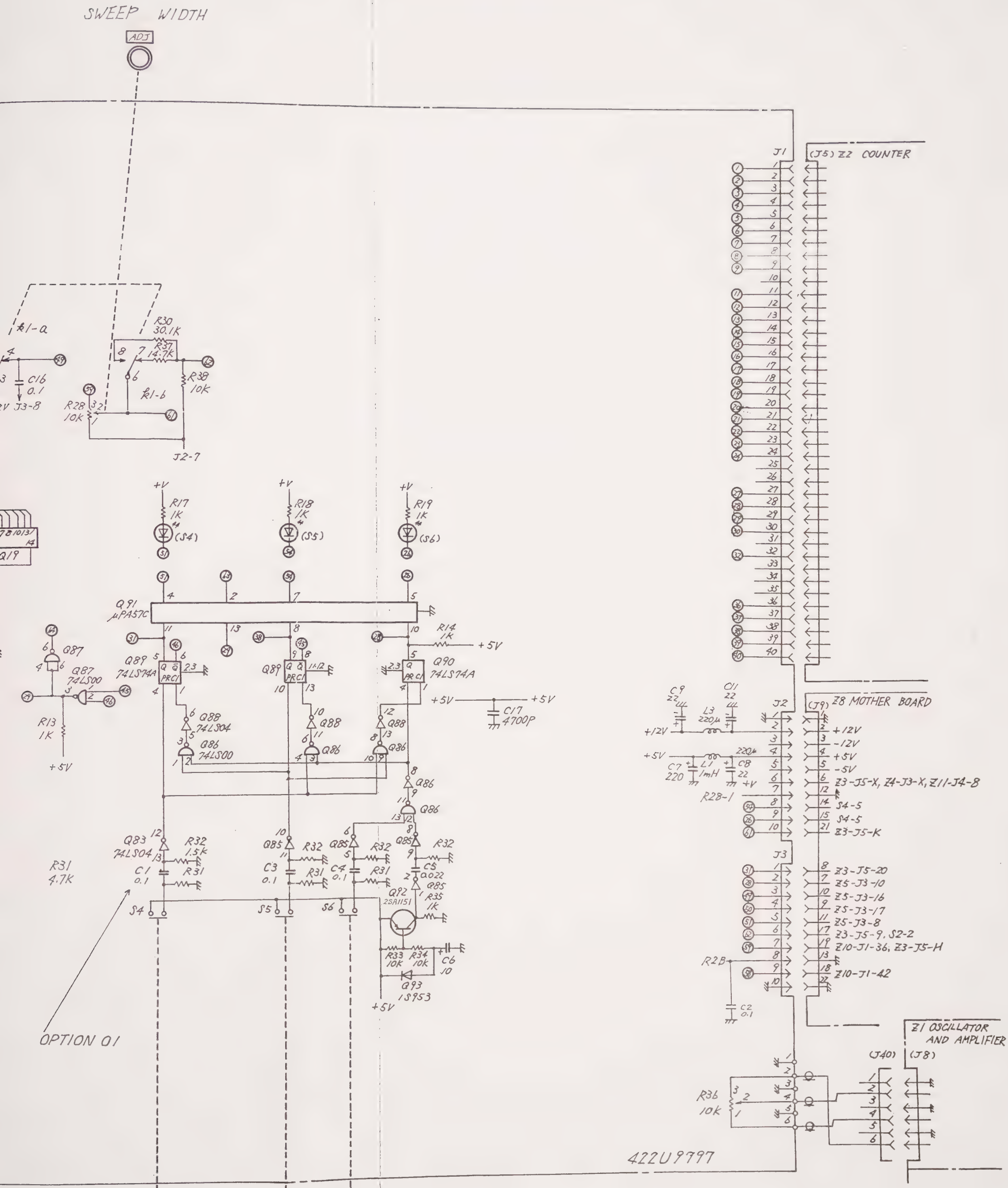


Fig. 5-19 Component Location of Z9


IF CENTER FREQUENCY
COARSE
FINE
VF BAND MHz
70
140
R15
390
+12V
Q95
1S252
C13
0.022
J3-8
K1
NF2E-12V
S1-1
S1-2
Q82
1S953
Q83
1S953
Q94
1S953
K1
+12V
R21
5k
R24
3.3K
R26
22K
R27
47K
R22
1K
R23
732
R25
100
J3-8
IF CENTER FREQUENC
FM DEVIATION
BB OUTPUT LEVEL
SWEEP WIDTH ±MHz
SWEEP OUTPUT ±Vp/75Ω
Q1
74LS157
Q2
74LS248
Q3
μPA56C
Q4
74LS248
Q5
μPA56C
Q6
74LS248
Q7
μPA56C
+5V
R40
68
R41
68
R42
68
Q8~Q19
LN513GK×12
Q8
Q9
Q10
Q11
Q12
Q13
Q14
Q15
Q16
Q17
Q18
R6
75
R2
150
R1
10
R3
10
R4
10
R5
10
Q21
μPA57C
Q22
μPA56C
Q25
μPA57C
Q26~Q31
LN38GP×6
R8
220
+V
(+18V)
Q26 Q27 Q28 Q29 Q30 Q31
Q46~Q51
LN38GP×6
R10
220
Q46 Q47 Q48 Q49 Q50 Q51
Q37~Q42
LN38GP×6
R9
220
Q37 Q38 Q39 Q40 Q41 Q42
Q55~Q60
LN38GP×6
R11
220
Q55 Q56 Q57 Q58 Q59 Q60
Q73~Q76. Q78. Q79
LN38GP×6
R12
220
Q73 Q74 Q75 Q76 Q78 Q79



Component list: Table 6-8

Fig. 5-20 CIRCUIT DIAGRAM OF Z9 LED DISPLAY (TRANSMITTER) (42W11127)

5.2.10 Z10 FRONT BOARD

(1) Circuit description

This circuit consists of the PCD circuit and DC AMPLIFIER of the IF AFC LOOP, BB output level control circuit, sweep reduction circuit, and BB sweeper frequency control circuit.

IF AFC LOOP consists of circuits for converting the frequency of the IF signal (J8) divided by Z2 COUNTER to the voltage by the PCD circuit (Q15 through Q21), for comparing it against the reference voltage by the comparator, and for returning it to the SWEEP OSC (Z1).

SWEEP REDUCTION is the circuit for reducing the IF sweep width by twice the BB frequency when it is "ON".

BB OUTPUT LEVEL is controlled to the 10 dB step by the attenuator (S2, R27 through R53) to continuously set 0 to 10 dB by the Variable Resistor (R56).

FM DEVIATION is set by the Variable Resistor (R56).

(2) Repair

1. IF OUTPUT Frequency is abnormal

   Apply the 437.5 kHz signal to J8.

   case 1 → PCD is abnormal

   Check the waveform of ❶ and the voltage of ❷.

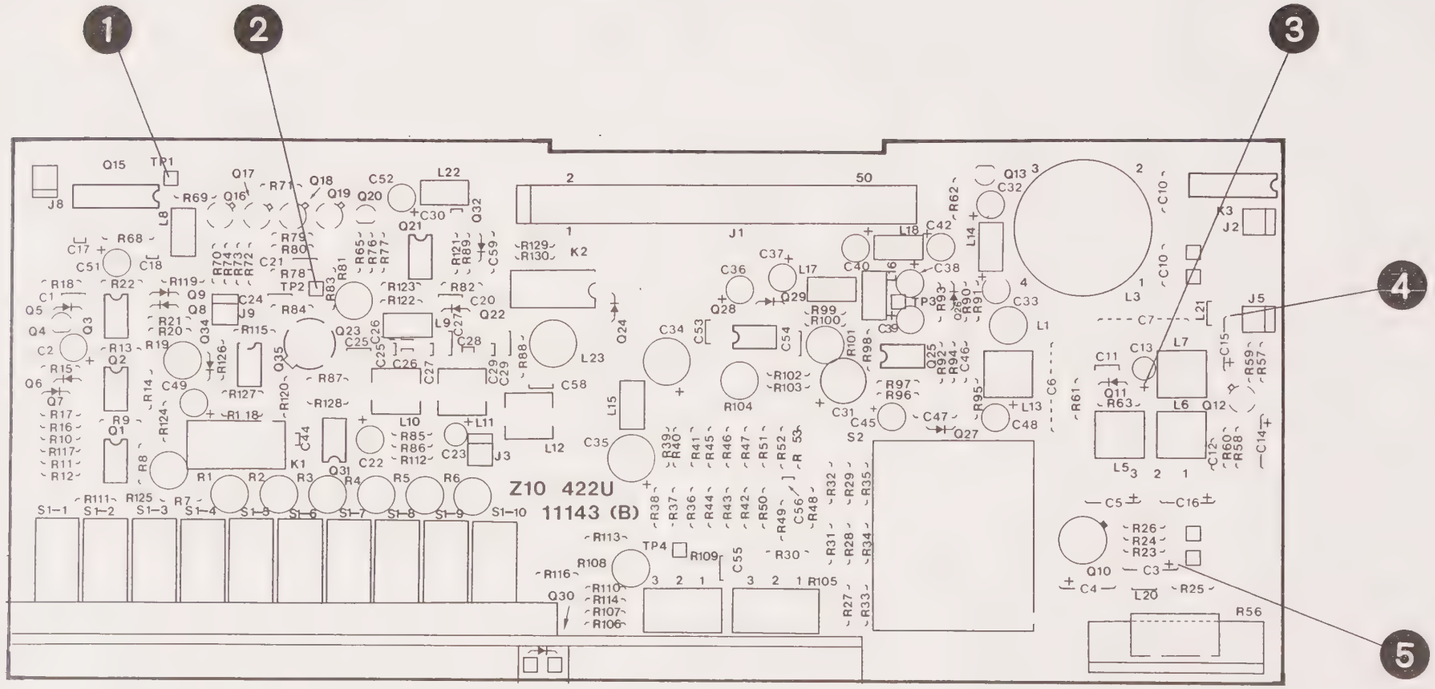


Fig. 5-21 Component Location of Z10

AM/FM 833K 250K 500K 2.4MHz 3.58MHz 4.43MHz 5.6MHz 8.2MHz 12.39MHz EXT

BB FREQUENCY CONTROL

S1-1 S1-2 S1-3 S1-4 S1-5 S1-6 S1-7 S1-8 S1-9 S1-10

R111 4.7K

R116 510 Q30 7LG226 +5V

C32 22 L14 220μ C33 22 +12VA

C34 100 L15 220μ C35 220 -12VA

R1 50K R2 50K R3 20K R4 20K R5 10K R6 10K

R7 3.3k R8 470 Q1 μPC251C R9 10K R10 10k R11 10k R12 10k R13 10k R14 10k Q2 7 Q4 2SK55E C2 47

R15 100K R16 1K R17 10k R18 100K R117 0~330 Q5 1S953 Q6 1S953 Q7 1S953 Q8 1S953 Q9 1S953 R19 1K R20 680 R21 10k R22 100k

C1 0.01 Q3 Q2 μPC251C Q3 μPC251C

R118 470 +12VA Q1.Q2.Q3 Q34 RD9.1EB C49 22

R119 470 -12VA Q1.Q2.Q3 C51 22

C48 22 C16 2.2

+10dBm(75Ω) R23 2.2k L20 R25 75 S2-9 C4 1 C3 1 Q10 2SC1254 C5 R24 820 R26 35.7 L13 1m

S2-C

SWEEP REDUCTION

+12VA R61 390 Q11 1S252 R63 1K L7 L5 33m 1m L6 33m C11 0.001

R56 500 BB OUTPUT LEVEL FM DEVIATION

S2-b C6 0.33 C7 0.33 L1 1m L3 10m

R28 107 R27 144.4 R29 144.4 R31 371 R30 91.7 R32 91.7 R34 1.185K R33 79.9 R35 79.9 R37 371 R40 371 R36 91.7 R38 91.7 R39 91.7 R41 91.7 R43 371 R46 1.185K R42 91.7 R44 91.7 R45 79.9 R47 79.9 R49 1.185K C36 R52 1.185K R48 79.9 R50 79.9 R51 79.9 R53 79.9 C56 0~56P

+5V

BB OUTPUT LEVEL dBm

OPTION

BB SWEEPER FREQUE

R90 4.7K C46 0.1 R95 220K C47 0.1 R96 1M R91 10K R92 220K Q27 1SR53 Q25 μPC151C R97 10K R98 100K Q26 1SR53 R93 5.6K R94 330K -12VB

PCD

FROM Z2-J2 J17 J8

+5V L8 220μ C18 0.1 R68 10K C17 5P

+12VB R70 680 R72 680 R73 1.5K R69 220 Q15 74121 Q16 2SC1254 Q17 2SC1254 R71 1.2K R74 330 C32 22 L22 220μ -12VB

L9 220μ +12VB R65 1.5K R66 300 R76 1K 2SA1115 Q20 R77 1K Q18 2SA711 Q19 2SA711 R78 1.5K R80 2.2K R79 2.2K Q21 μPC258C R122 10K R81 20K Q22 1S252 R123 10K R82 560

AFC DC AMP

R84 150K +12VB Q23 μPC 134 R87 1.5K L10 LY4-902 L11 LY4-712 L12 LY4-712 C25 2P50P C26 880P C27 3770 C28 4707 C29 3630P -12VB R85 47 C23 R85 10K R86 6.8K

C36 C37 C38 C39 22 22 22 22 L16 L17 L18 +12VB -12VB +5V C40 C42 22 L16~L18 22μ

C21 0.01

550mV/70MHz SWEEP CENTER

C44 100P R120 10K Q31 C22 22 +12VB R112 47K Q31 -12VB μPC251C SWEEP SIG for Slope Adj

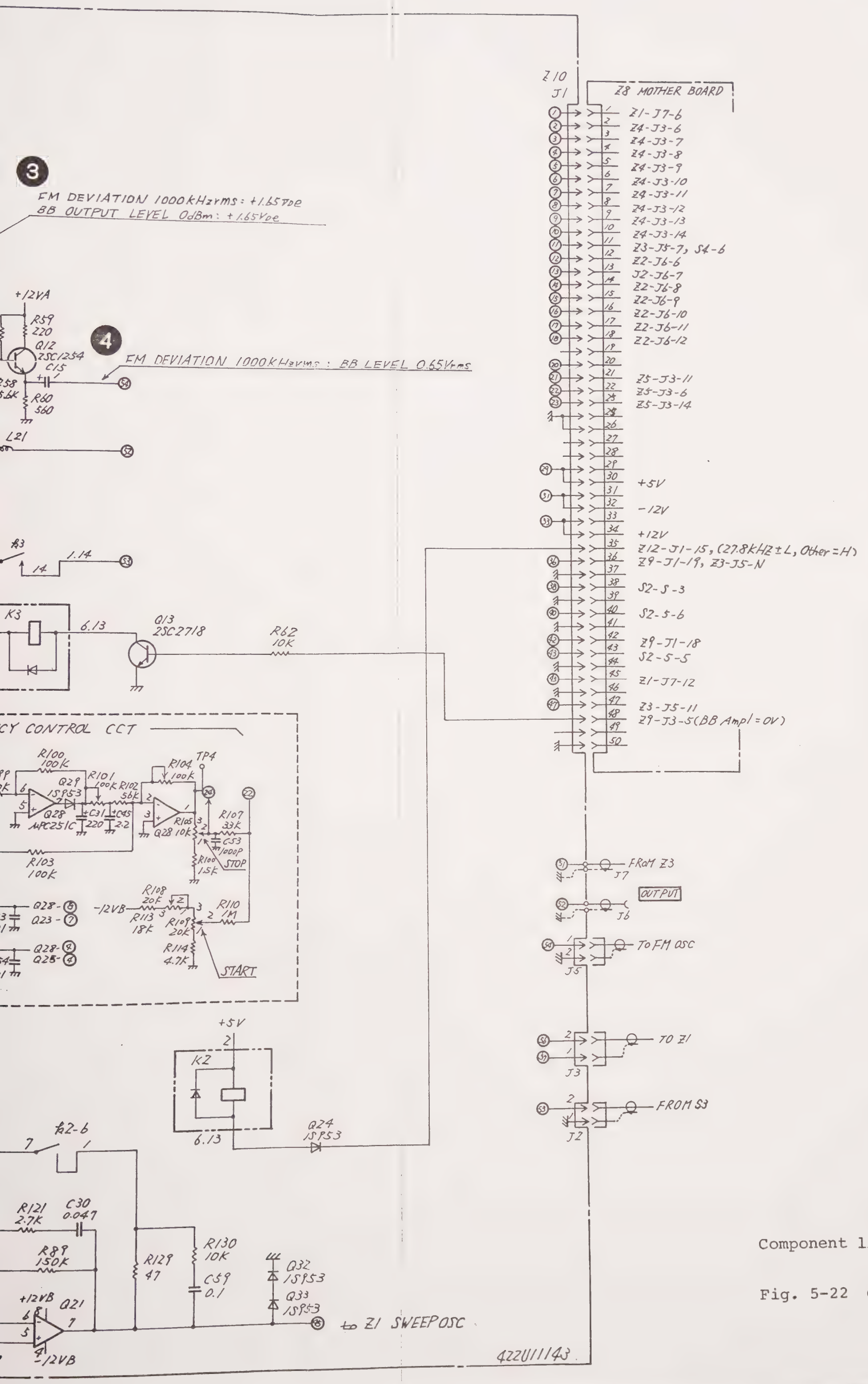
AFC COMPARATOR

R88 1.5K C58 L23 33mH

14 k2-a 8

1

H : 0.5μs/div
V : 1V/div
(at 70MHz)



Component list: Table 6-9

Fig. 5-22 CIRCUIT DIAGRAM OF Z10 FRONT BOARD (TRANSMITTER) (42W11128)

5.2.11 Z11 POWER SUPPLY

(1) Circuit description

This circuit consists of 6 dc stabilizing power circuits of ±5 V, ±12 V, and ±18 V.

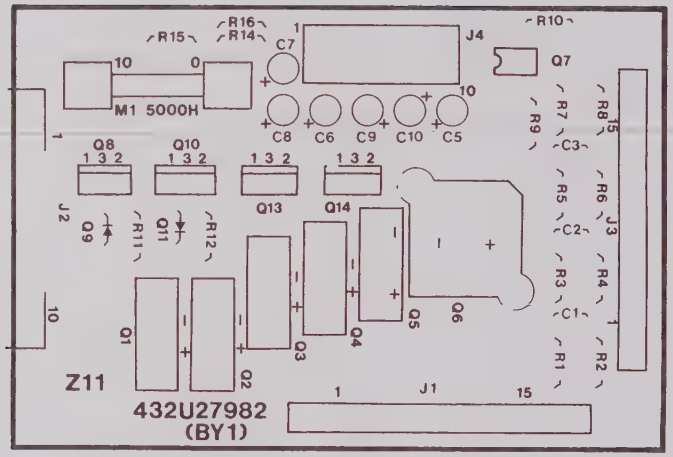


Fig. 5-23 Component Location of Z11

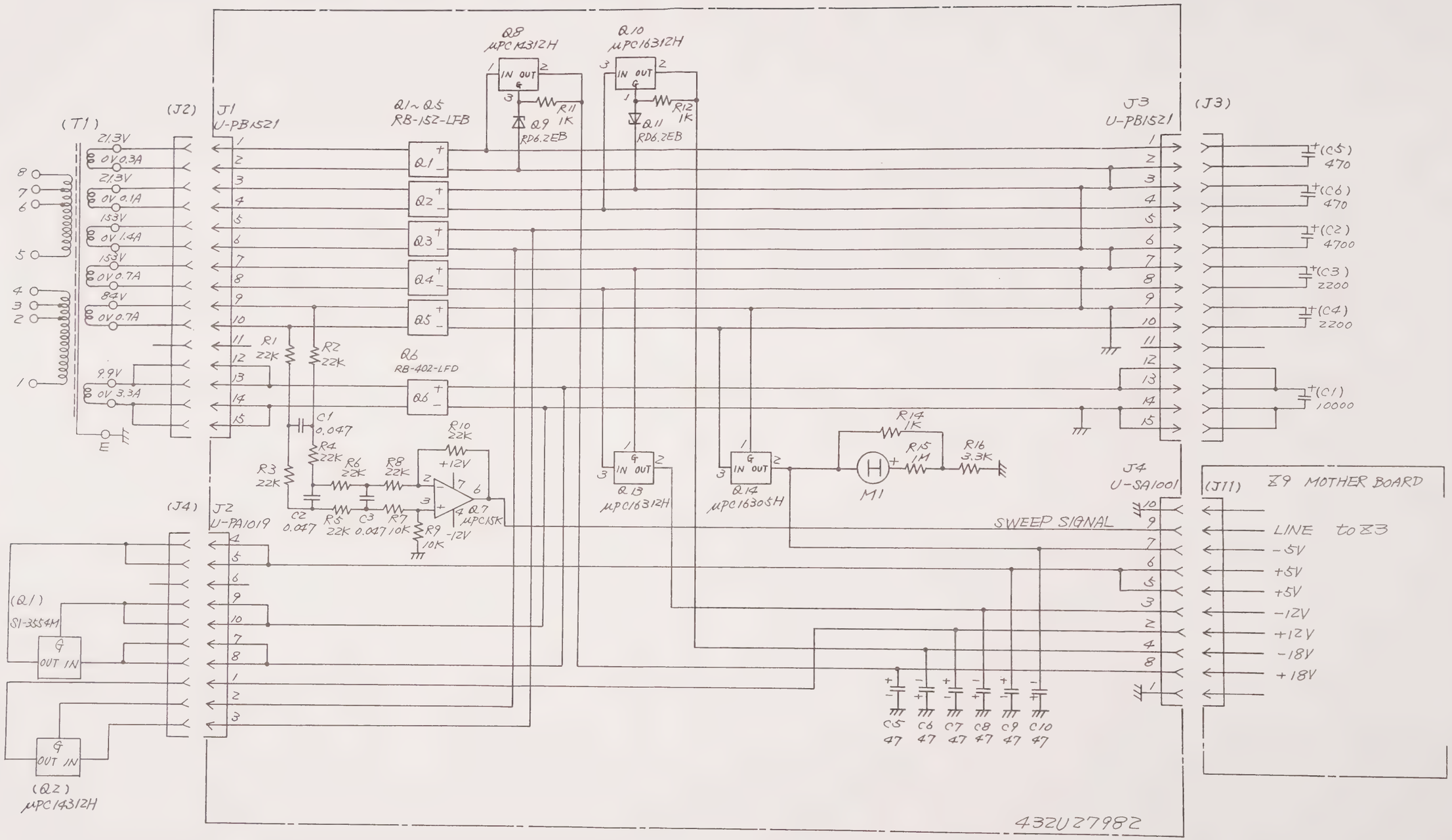


Fig. 5-24 CIRCUIT DIAGRAM OF Z11 POWER SUPPLY (TRANSMITTER)

(43W28520)

COMPONENT LIST: Table 6-10

5.2.12 Z2 SWITCH BOARD

(1) Circuit description

This circuit consists of the switches (S1-2 to S1-5) for selecting the sweep signal frequency, the sweep reduction switch (S1-1), and the LOW BB frequency switch.

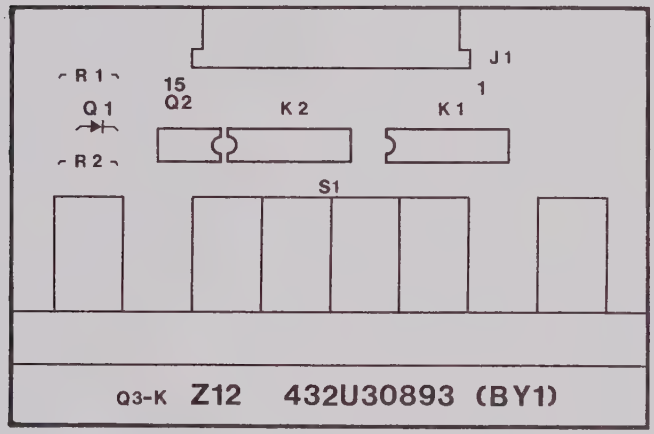


Fig. 5-25 Component Location of Z12

CIRCUIT DIAGRAM OF Z12 SWITCH BOARD :

See Fig. 5-6 CIRCUIT DIAGRAM OF THE TRANSMITTER

COMPONENT LIST: Table 6-11

5.3 RECEIVER

5.3.1 General

The receiver unit may be functionally divided into the IF receiver section, BB receiver section, control section, and CRT section.

IF receiver section consists of a demodulator for demodulating the BB signal from the IF input signal, frequency marker circuit, IF return loss circuit, and IF amplitude detection circuit.

The input circuit consists of the programable attenuator for setting the IF input level to the optimum operating point of the receiver.

BB receiver section consists of a circuit for detecting the amplitude of the BB signal and a circuit for detecting the phase. The input circuit consists of the programable attenuator for setting the BB input level to the optimum operating point of the receiver.

Control section has the functions of controlling the variable attenuator of the BB/IF input circuits and of automatically setting the vertical sense of the CRT.

CRT section consists of a high voltage generating circuit, vertical AMP, and horizontal AMP.

The block diagram is shown in Fig. 5-30. The circuit consists of 15 PC boards, Z1 through Z15, Z18 and Z19, each of which has the following functions:

Z1 RANGING AND AVG consists of the function select circuit, ranging circuit, P-P detector circuit, and averaging circuit.

Z2 PHASE DETECTOR consists of the PLL circuit for detecting the phase of the BB signal, local oscillator, and circuit for detecting the receive frequency.

Z3 BB DETECTOR consists of the programable ATT, LINEARITY AND DG detector, BB level detector, and BB AMPL detector. The main function of this circuit is to detect the amplitude of the BB signal.

Z4 DISCRIMINATOR consists of a limiter, discriminator, DISC FOR AFC, and Horizontal SIGNAL circuit. The main function of this circuit is to demodulate the BB signal from the 17.78 MHz IF signal.

Z5 IF MIX AND RETURN LOSS consists of the programable ATT, local oscillator, IF AGC circuit, IF level detector, IF AMPL detector, and IF return loss detector.

The main function of this circuit is to convert the frequency of the IF input signal to 17.78 MHz IF signal.

Z6 MARKER AND SPECTRUM consists of the IF marker detecting circuit and a spectrum detecting circuit.

Z7 CPU BOARD is a digital processing circuit using the CPU and consists of the A/D converter and I/O circuit, etc.

Z9 MOTHER BOARD is the circuit for connecting the various PC boards.

Z10 OPERATING/LED BOARD consists of a keyboard for inputting various parameters and a display section for outputting the data.

Z11 DRIVER consists of a circuit for outputting the data from the Z7 CPU to the Z10 LED board and a circuit for counting the marker frequency.

Z12 X SELECT, X-Y RECORDER consists of a circuit for switching Y1, Y2 and marker signals on the time sharing basis, circuit for setting the phase of the Horizontal signal, and circuit for driving the X-Y recorder.

Z13 CRT DISPLAY consists of the high voltage generating circuit for driving the CRT, vertical AMP, and horizontal AMP.

Z14 POWER SUPPLY is the power supply circuit of the series regulator Z15 for converting ac to regulated dc.

Z15 AVG

This circuit is used to normalize the image to be measured in conjunction with the Z1 RANGING AND AVG circuit.

Z8 GP-IB (Option) transmits and receives the information to and from GPIB interface bus (IEEE std 488-1978).

Z18 CONNECTOR BOARD consists of the GPIB connector and GPIB address switch.

Z19 CHARACTER DISPLAY BOARD displays the measurement parameters and measurement results (IF/BB input level, deviation, frequency etc.) on the CRT in alphanumeric characters.

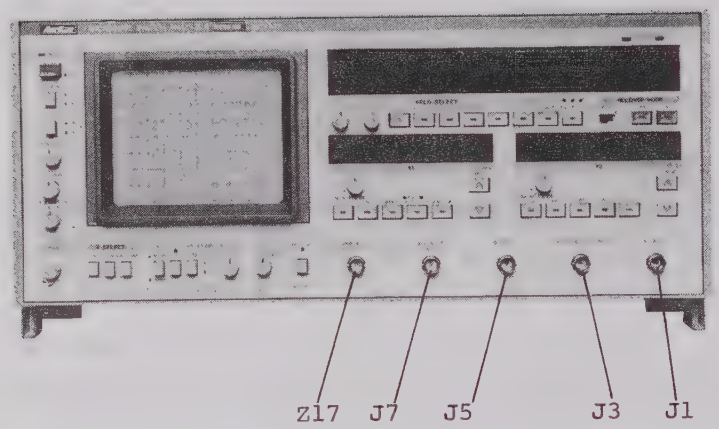


Fig. 5-26 Front View of Receiver

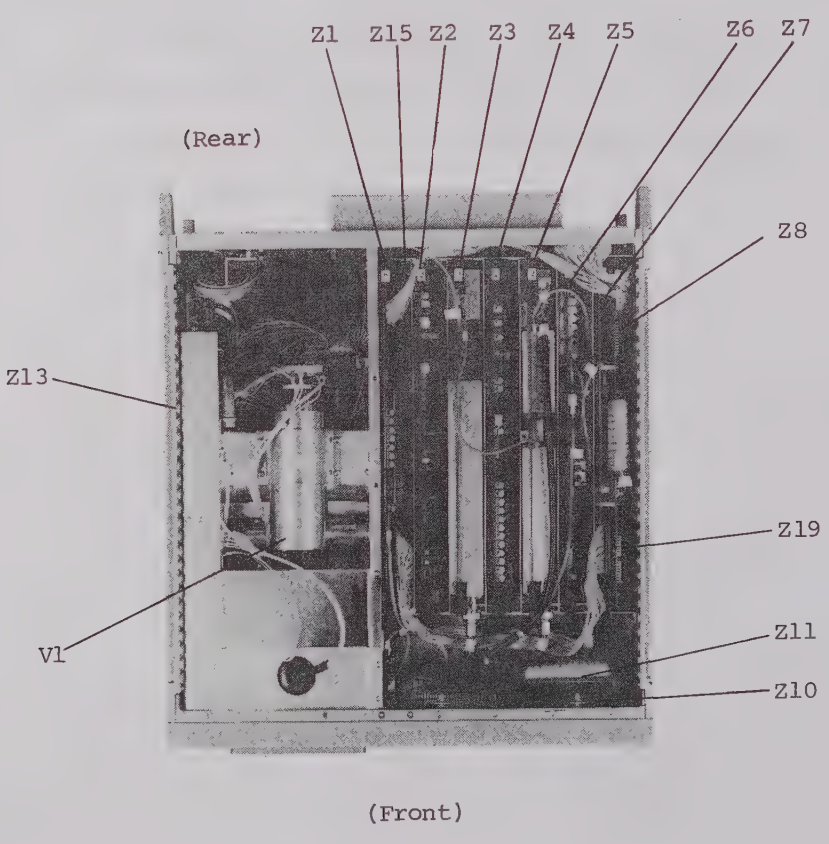


Fig. 5-27 Top View of Receiver

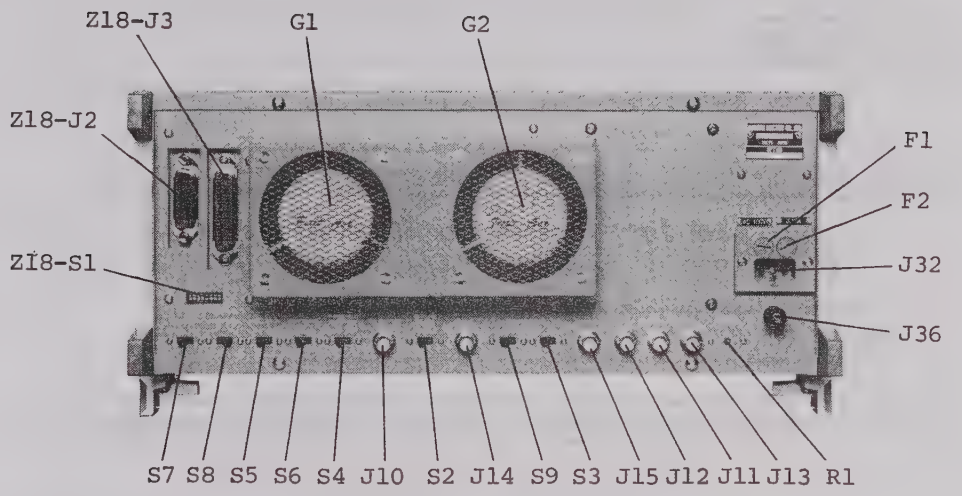


Fig. 5-28 Rear View of Receiver

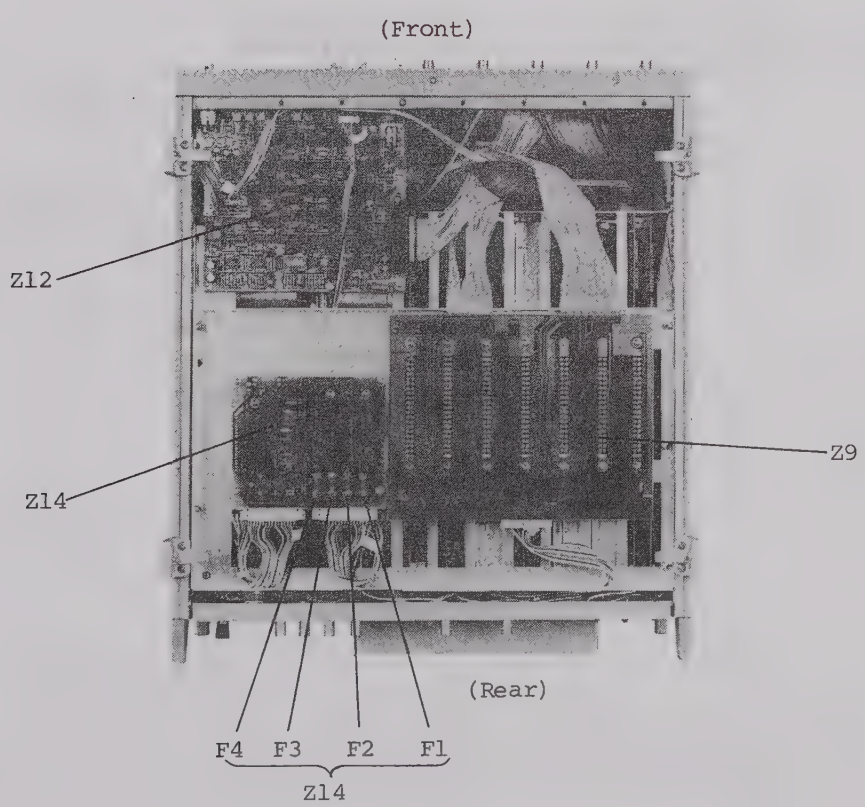


Fig. 5-29 Bottom View of Receiver

5.3.2 Troubleshooting the Receiver

(1) **NO POWER ON**

Check the fuse and Z14 POWER SUPPLY (see 5.3.15)

(2) **Troubles ⇨ Check the dc voltages of power source**

Check the dc voltages with reference to Z9 Mother board (see 5.3.10).

(3) **IF input level is not dispayed normaly**

case 1 → **IF input signal is not displayed properly**

Check the IF level (≥-20 dBm)

Check that the IF input frequency band is matched to Receiver Mode band.

Check that the IF input frequency sweep width is less than 70 ±25 MHz or 140 ±50 MHz.

case 2 → **AFC circuit does not operate**

Sympton: "-" (minus) of IF level LED goes on and off independently.

Check the disappearance of IF signal with reference to Z5 IF MIX and Return Loss (see 5.3.7) and Z4 discriminator (see 5.3.6).

Determine the abnormal point in the AFC loop with reference to Z5 (see 5.3.7) and Z4 (see 5.3.6).

Check the Z7 CPU board (see 5.3.9) and connection.

(4) FM deviation is not displayed normaly

case 1 → BB input level and IF input level are displayed normally.

Check the circuit on Z4 Discriminator (see 5.3.6) and Z7 CPU board (see 5.3.9).

case 2 → BB input level display is abnormal

Check the circuit on Z3 BB detector (see 5.3.5) and Z7 CPU board (see 5.3.9).

case 3 → AFC loop does not operate

Check the circuits with reference to case 2 of item (3).

case 4 → THRESHOLD EXTENSION (Rear panel) is ON?

Turn OFF the THRESHOLD EXTENSION, when the FM modulation frequency is over 556 kHz.

(5) BB Frequency Hz tunning LED does not light

case 1 → When using the Receiving Mode BB, LED is lighted.

Check the circuit on Z4 Discriminator (see 5.3.6).

case 2 → Both Receiving Modes IF and BB are abnormal

Check the circuits on Z3 BB detector (see 5.3.5) and Z7 CPU board (see 5.3.9).

case 3 → Input signal is abnormal.

Check the input signal.

(6) Slide Marker does not function

Check the circuits on Z6 Marker and Spectrum (see 5.3.8), Z3 BB detector (see 5.3.5) and Z12X select, X-Y recorder (see 5.3.13).

(7) **IF Amplitude can not be measured**

Check the circuits on Z5 IF MIX and Return loss (see 5.3.7), Z3 BB Detector, Z12 X select, X-Y recorder (see 5.3.13) and Z7 CPU board (see 5.3.9).

(8) **Linearity and DG can not be measured**

case 1 → **When using Receiving Mode BB, these can be measured**

Check the circuits on Z5 (see 5.3.7) and Z4 (see 5.3.6).

case 2 → **Both Receiving Mode IF and BB are abnormal**

Check the circuits on Z3 (see 5.3.5), Z12 (see 5.3.13), Z1 (see 5.3.3) and Z7 (see 5.3.9).

(9) **Delay and DP cannot be measured**

case 1 → **When using Receiver Mode BB, these can be measured.**

Check the circuits on Z5 (see 5.3.7) and Z4 (see 5.3.6).

case 2 → **Both Receiving Mode IF and BB are abnormal**

Check the circuits on Z3 (see 5.3.5), Z2 (see 5.3.4), Z12 (see 5.3.13), Z1 (see 5.3.3) and Z7 (see 5.3.9).

(10) **IF Return loss cannot be measured**

Check the circuits on Z5 (see 5.3.7), Z1 (see 5.3.3) and Z12 (see 5.3.13).

(11) **Spectrum cannot be measured**

Check the circuits on Z6 (see 5.3.7), Z4 (see 5.3.6), Z1 (see 5.3.3), Z12 (see 5.3.13) and Z7 (see 5.3.9).

(12) **AM-PM conversion cannot be measured**

Check the circuits on Z2 (see 5.3.4) and Z7 (see 5.3.9).

(13) NO images appear on the CRT

case 1 → IF level, BB level and P-P values are displayed normally

Check the circuits on Z13 (see 5.3.14) CRT Driver.

case 2 → No deflection takes place on the horizontal axis

Check the Horizontal signal generator on Z4 (see 5.3.6), analog switch on Z3 (see 5.3.5), X select switch on Z12 (see 5.3.13) and Horizontal AMP on Z12 (see 5.3.13).

case 3 → No deflection takes place on the Y axis, but the P-P values are normal.

Check the Y signal switch on Z12 (see 5.3.13) and Y axis AMP on Z13 (see 5.3.14).

(14) BLANKING, SCALE INTEN and INTENSITY do not function

Check the circuits on Z12 (see 5.3.13) and Z13 (see 5.3.14)

(15) NORMLZR function does not operate

Check the circuits on Z1 (see 5.3.3) and Z7 (see 5.3.9).

(16) P-P function does not operate

Check the P-P detector circuit on Z1 (see 5.3.3) and Z7 CPU (see 5.3.9).

(17) RANGE control function does not operate

case 1 → IF Return Loss image cannot be changed linearly by the manual range keys

Check the circuit on Z5 (see 5.3.7) and Z7 (see 5.3.9)

case 2 → Auto ranging function does not operate

Check the circuits on Z1 (see 5.3.3) and Z7 (see 5.3.9).

(18) Character or numerical LED does not light normaly

Check the circuits on Z10 (see 5.3.11) and Z11 (see 5.3.12).

(19) X-Y Recorder output function does not operate

Check the circuits of Z12 (see 5.3.13) and Z7 (see 5.3.9).

BB INPUT

-61dBm to +11dBm
60K to 15MHz

IF INPUT

-21dBm to+11dBm
70±25MHz
140±50MHz

DC INPUT → to Z1

(Max ±400mV)

Z17
20dB MISMATCH

Z14
LINE → ~/⎓ → DC

+12V
-12V
+5V(D)
+5V(A)
-5V

IF RETURN LOSS INPUT

-60dBm to-20dBm

Z5 IF MIX AND RETURN LOSS

IF AMPL

IF SIG (to Z3)

ATT:4,8,16dB

MIX

CONTROL SIG (from Z7)

fIF:17.78MHz

17.8 1MHz

LOG

IF AMPL → to Z1

IF AGC LOOP

THRESHOLD EXTENSION
1. ON
2. OFF

E

LOCAL OSC
VCO
70MHz Band:87.78±25MHz
140MHz Band:122.22±25MHz

AFC LOOP

IF Band
1. 70MHz
2. 140MHz

(to Z12)

-E1 VCO Offset
-E2
70MHz Band
140MHz Band

LOCAL SIGNAL

IF RETURN LOSS

MIX

ATT 1,2,4,8
16,32dB

LOG

IF Return Loss (to Z1)

Z4 DISCRIMINATOR

LIMITER

17.78MHz

L.P.F ON
BB FREQ
(f1 - f4
(from Z2)

Window Comparator

SPECTRUM HOR

MS

PCD

d/dt

A

Z6 MARKER AND SPECTRUM

IF MARKER

MIX

ADD

IF Marker → (to Z3)

Center Marker

Marker Select
1. SLIDE
2. SLIDE 2MHz COM

87.78MHz ÷10

122.22MHz ÷10

Comb Marker

from Z7
2MHz

d/dt

(30dB)

MIX

VCO

MIX

70MHz Band
62.78~87.78MHz
140MHz Band
72.22~122.22MHz

1/16

70MHz Band;0~25MHz
140MHz Band;0~50MHz

1/16

IF SIG
from Z3

2MHz

1/160000

1/4

SPECTRUM

MIX

to Z1

÷10

17.78MHz

SPECTRUM ON/OFF
(from Z7)

LINE

X SE
1.
2.
3.

CLOCK

+E —/\/— -E

MARKER FREQUECY

12.5Hz

GATE

C

COUNTER

DISPLAY

DRIVER

KEY BOARD

μ-P

I/O

CONTROL SIG

A/D

SELECT

LEVEL (from Z3
Y1 RANGE (from Z
Y2 RANGE (from Z
P-P (from Z

I/O

Z10 OPERATING/LED BOARD

Z11 DRIVER

Z7 CPU BOARD

GP-IB

Z8 GP-IB
(OPTION)

INTERFACE CONTROLLER

PLOTTER INTERFACE

8 BIT PARALLEL

Z19

Z19 CONNECTER BOARD

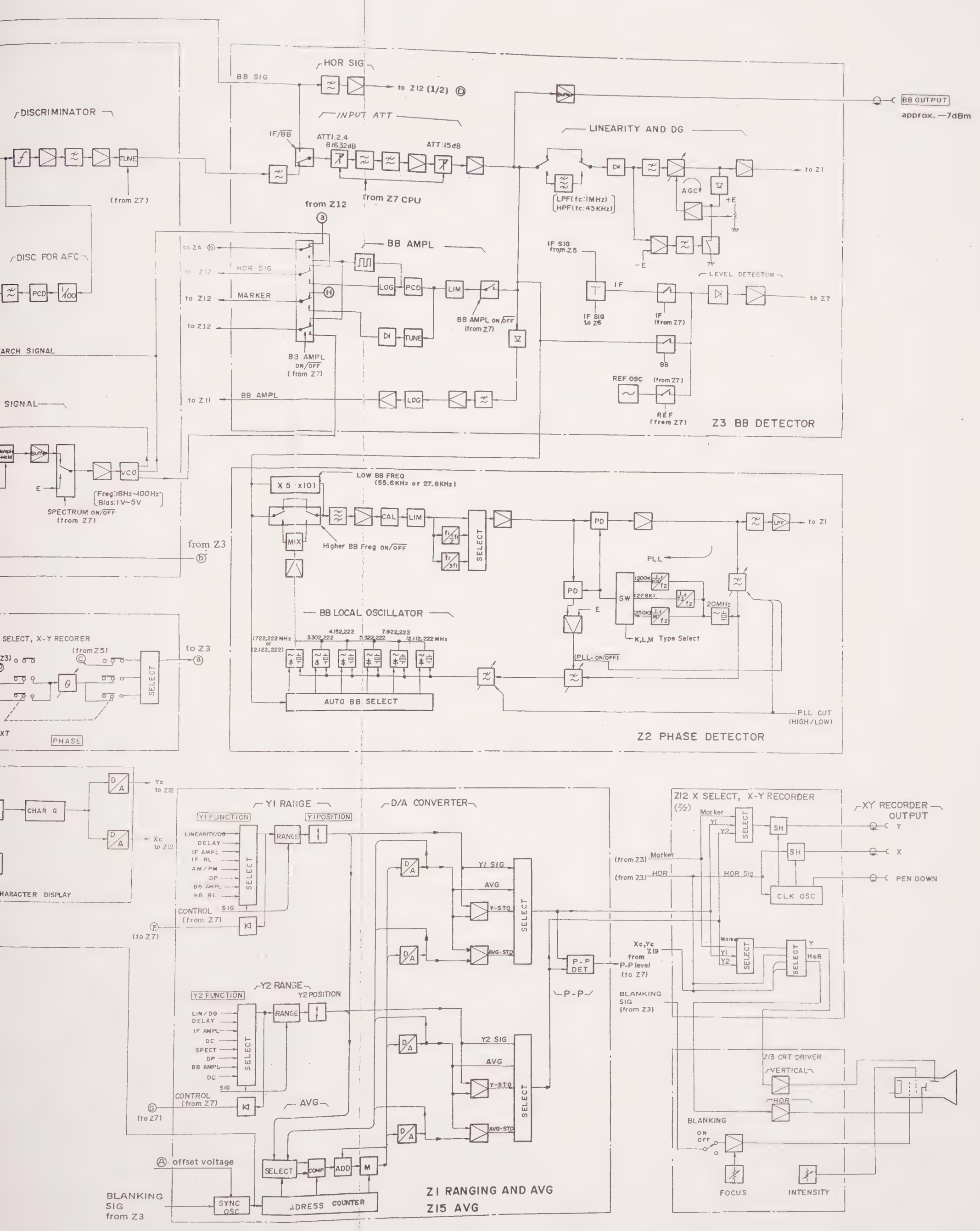


Fig. 5-30 BLOCK DIAGRAM OF RECEIVER

MISMATCH 20dB RET LOSS

61.4Ω

Z17 20dB MISMATCH

J1 SP-3CPJ(or J3WE-2) — IF INPUT

J3 SP-3CPJ(or J3WE-2) — RETURN LOSS INPUT

J5 SP-3CPJ(or J3WE-2) — BB INPUT

J7 SP-3CR(or J3WE-2) — DC INPUT

J10 BNC-R101-NI — BB OUTPUT -7dBm/75Ω

J11 BNC-R101-NI — xY RECORDER OUTPUT

J28-1 (a) — Y

J12 BNC-R101-NI

J28-2 (b) — X

J13 BNC-R101-NI

J28-3 (c) — PEN DOWN

* x-Y RECORDER is optional function

from J3

J2. J4 BNC P620

J8 PIO11-2F

J33

J33 CNF3A-34D-AC40S BNC-P620

J6

J9 PIO11-2F

J2 J4

J26 PIO11-2F

Z1 RANGING AND AVG

Z15 AVG

Z2 PHASE DETECTOR

Z3 BB DETECTOR

Z4 DISCRIMINATOR

Z5 IF MIX AND RETURN LOSS

Z6 MARKER/ SPECTRUM

Z9 MOTHER BOA

J34 CNF3A-50D-AC40S

Z11 LED DRIVER

J27 PIO11-2F

Z10 OPERATING/LED BOARD

J38

Z12 X SELECT X-Y RECORDER

J24 DFI-15S -25R24

J25 DA-15S25 R24

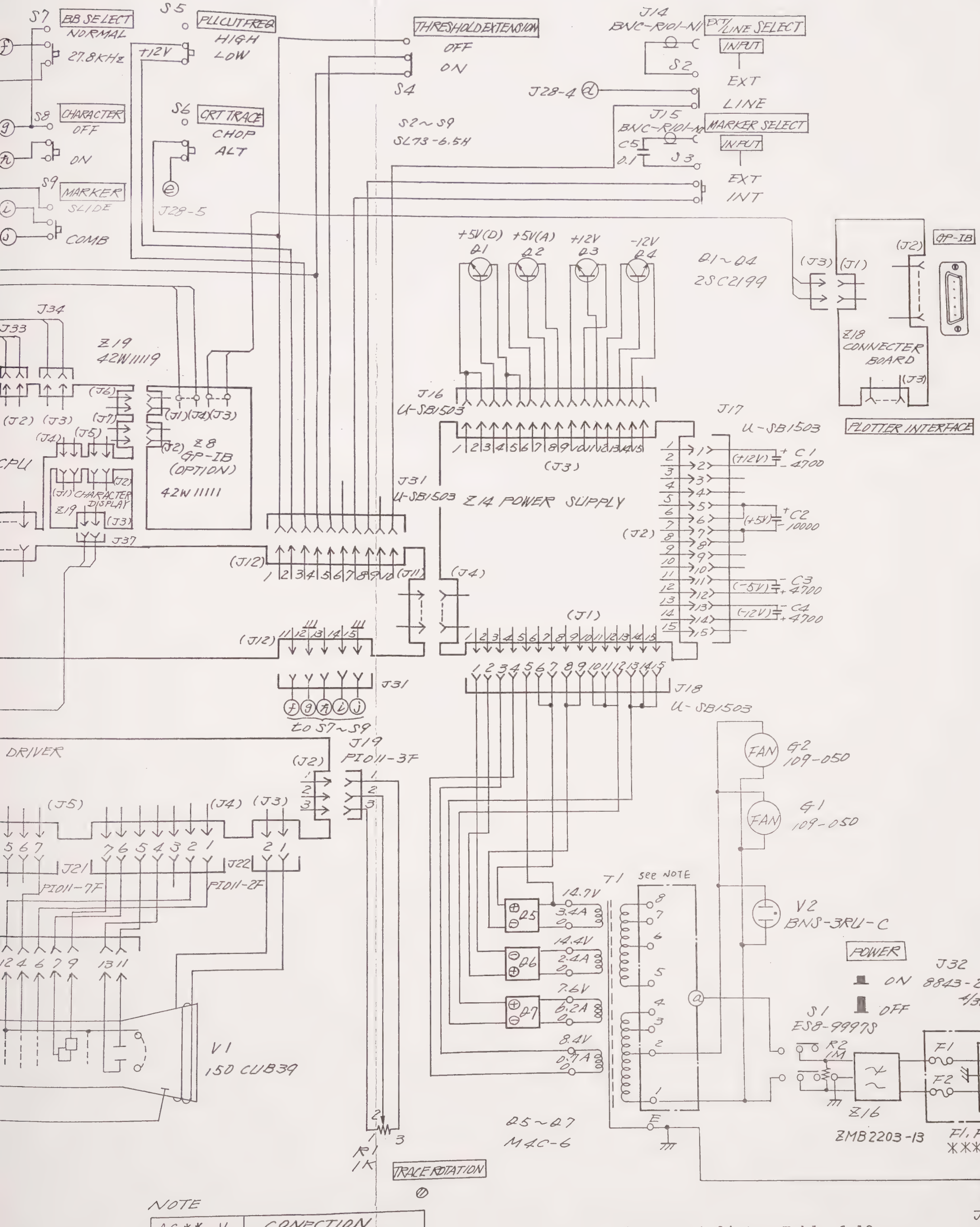
J28 DFI-5S25 R24

(e) to S6

(a)(b)(c)(d) to -J11, J12 J13 S2

Z13

J20 PIO11-7F



NOTE

AC ** V	CONECTION	
100~108V	1 to 5	a to(2to6)
108~117V	1 to 5	a to(3to7)
117~127V	1 to 5	a to(4to8)
200~216V	2 to 5	a to 6
216~234V	3 to 5	a to 7
234~254V	4 to 5	a to 8

Component list: Table 6-12

Fig. 5-31 CIRCUIT DIAGRAM OF ME453/538K/L/M RECEIVER (42W11103)

5.3.3 Z1 RANGING AND AVG

(1) Circuit description

This circuit consists of the circuit for automatically setting the measuring image on the CRT, the circuit for automatically detecting the characteristic deviation, and the normalizer circuit.

AUTOMATIC RANGING CIRCUIT

The scale sensitivity on the CRT must be set according to the measured value to read the characteristics of the measured objects obtained by the frequency sweep method. Consisting of the circuits as shown in Fig. A, this equipment is capable of automatically setting the scale sensitivity on the CRT and digitally displaying the scale sensitivity.

The deviation of characteristics obtained through the detector is detected by the p-p (Peak to Peak) detector, the scale sensitivity in the form that is easiest to read is decided by the microprocessor, the range setting attenuator is controlled, and this value is displayed on the LED at the same time.

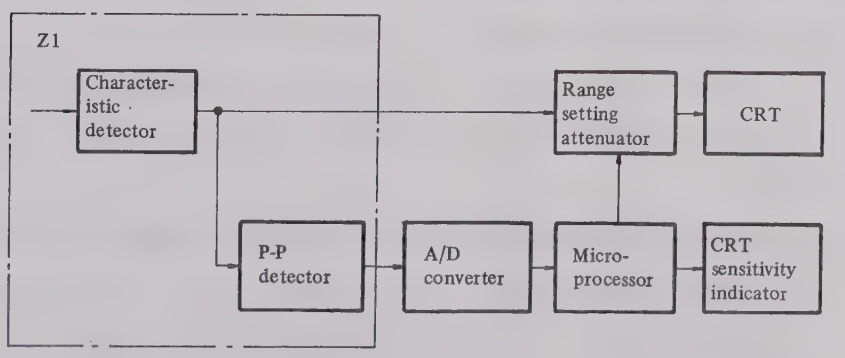


Fig. A BLOCK DIAGRAM OF AUTOMATIC RANGING CIRCUIT

An approximately 20% of overlapping range is provided between ranges within the switchable portion to ensure operational stability. Some measuring items use different units for the CRT scale. For example, ns for delay characteristic, % for linearity and DG (Differential Gain), DEG for DP (Differential Phase), dB for amplitude characteristic, and DEG/dB for AM-PM conversion characteristics, etc. These units may also be automatically displayed on the LED for each measuring item, so that they may be read very earily.

For example, such as adjustments of the out of band characteristics and within pass band characteristics, coarse adjustment while observing the whole characteristics, or fine adjustment while observing partial characteristics, etc., the center frequency or bandwidth must be varied according to the objectives, which causes the characteristic image to change each time. Even in such case, an easy-to-read range can always be set automatically. In addition, this automatic ranging function is also effective where the adjustment point is on the top of the rack which has to be separated from the measuring equipment for adjustment. Y1 channel consists of the RANGE circuit (Q4 through Q6) and p-p detector circuit (Q8 through Q21).

Y2 channel consists of the RANGE circuit (Q25 through Q27) and p-p detector circuit (Q24 through Q31).

Automatic characteristic deviation detector circuit

The transmission characteristic of the object to be measured is often evaluated based on the maximum deviation value of the transmission band amplitude, group delay, and DG, etc. In such case

in the past, the maximum deviation value was visually read from the image being displayed on the CRT. This naturally resulted in many read errors and no quick measurement could be expected. By employing the circuit composition as shown in Fig. B below, this equipment displays the deviation value directly and quickly. For example, measurement of the p-p value of the delay characteristic requires a wide display range of 0.1 ns to 400 ns. This equipment has an automatic ranging circuit placed before the p-p detector and this circuit is always operated when displaying the p-p value, thereby reducing the load on the p-p detector and enabling accurate display in a wide range. In such case, the p-p value to be digitally displayed is obtained through a calculation of the output level of the p-p detector and setting conditions of the automatic ranging circuit.

The p-p detector circuit selects Y1 and Y2 using the selector (Q70), detects the positive peak value with Q71 and negative peak value with Q72, adds both values with Q71, and sends it to Z7 CPU.

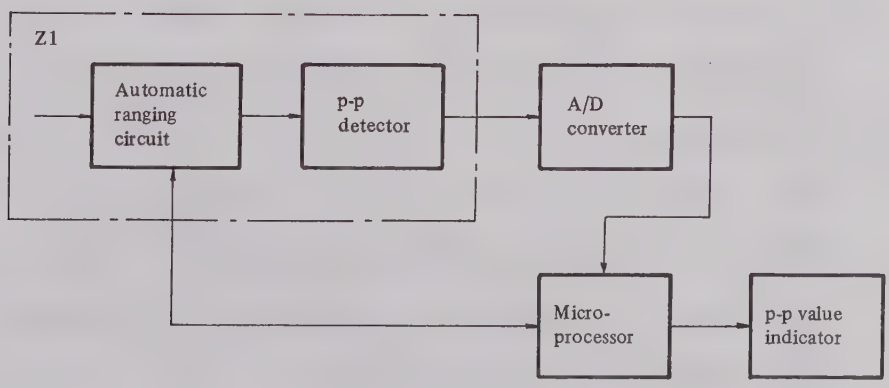


Fig. B BLOCK DIAGRAM OF P-P DEVIATION DETECTOR

Normalizer circuit

When the frequency sweep method is employed for a measurement, the deviation of the measuring system containing the internal deviation of the measuring equipment is added to the image to be measured and the correct characteristics of the object to be measured may not be readily observable. To cope with this problem, this equipment is provided with the normalizer function for temporarily storing the deviation of the measuring system and subtracting it from the measured result for display. The basic block diagram of this function is shown in Fig. C.

The address counter which specifies the address of the memory corresponding to the horizontal axis frequency is driven by the voltage control oscillator synchronized with the horizontal axis sweep signal. Therefore, all addresses of the memory can be aligned with the horizontal axis of the CRT correctly even if the frequency of the horizontal axis sweep signal is changed. The A/D converter is not used in writing the deviation of the measuring system into the memory. Only when there is difference between the analog output of the D/A converter and the input Y axis signal, the least significant digit is corrected for each sweep using an adder/subtractor. Therefore, the Y axis signal data stored in the memory corresponds to the average value of the input signals for each frequency without random noise. To subtract and display the deviation of the measuring system, the contents of the memory thus obtained must be fixed and its output must be analogously subtracted from the Y axis input signal.

As described earlier, the noise components in the data accumulated in the memory are averaged. Therefore, when the data are connected to the CRT through the D/A converter, a clear image can be obtained even when a noisy signal is received. This can be expressed by formular (1) below, supposing the signal-to-noise ratio before improvement to be $(S/N)_1$ and that after improvement to be $(S/N)_2$.

$$(S/N)_2 = 20 \log \sqrt{n}\ (S/N)_1 \quad \ldots\ldots\ldots \quad (1)$$

Here, n is the Averaging Factor. This equipment may allocate 2,000 Y axis dispersions (Memory: 11 bits) for noise in full scale of the CRT and such noise can be improved by 33 dB. This is another important feature of the normalizer function, which is highly effective in measuring low C/N signals such as satellite system.

The circuits are located on the Z1 and Z15 AVG.

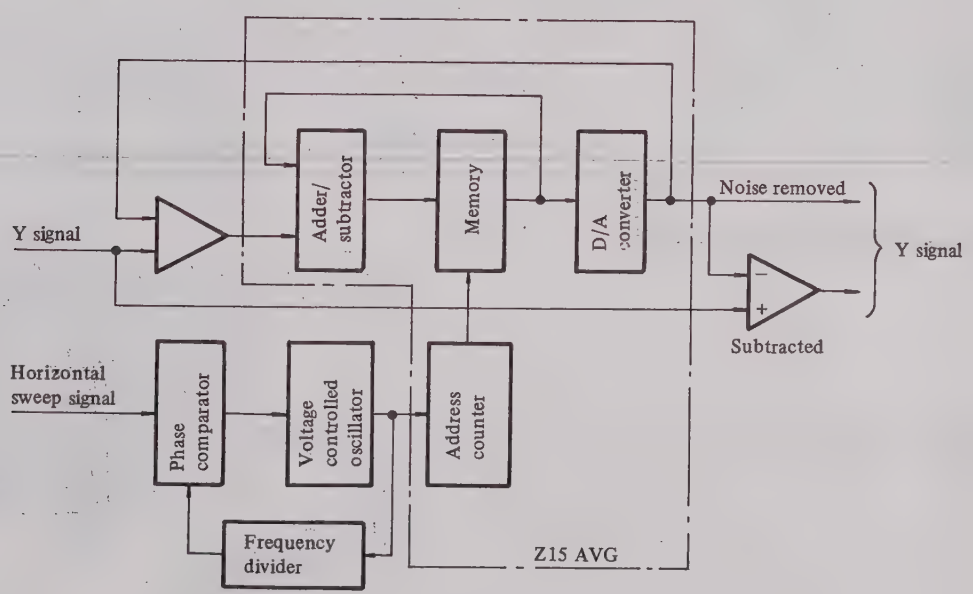


Fig. C Basic block diagram of normalizer function

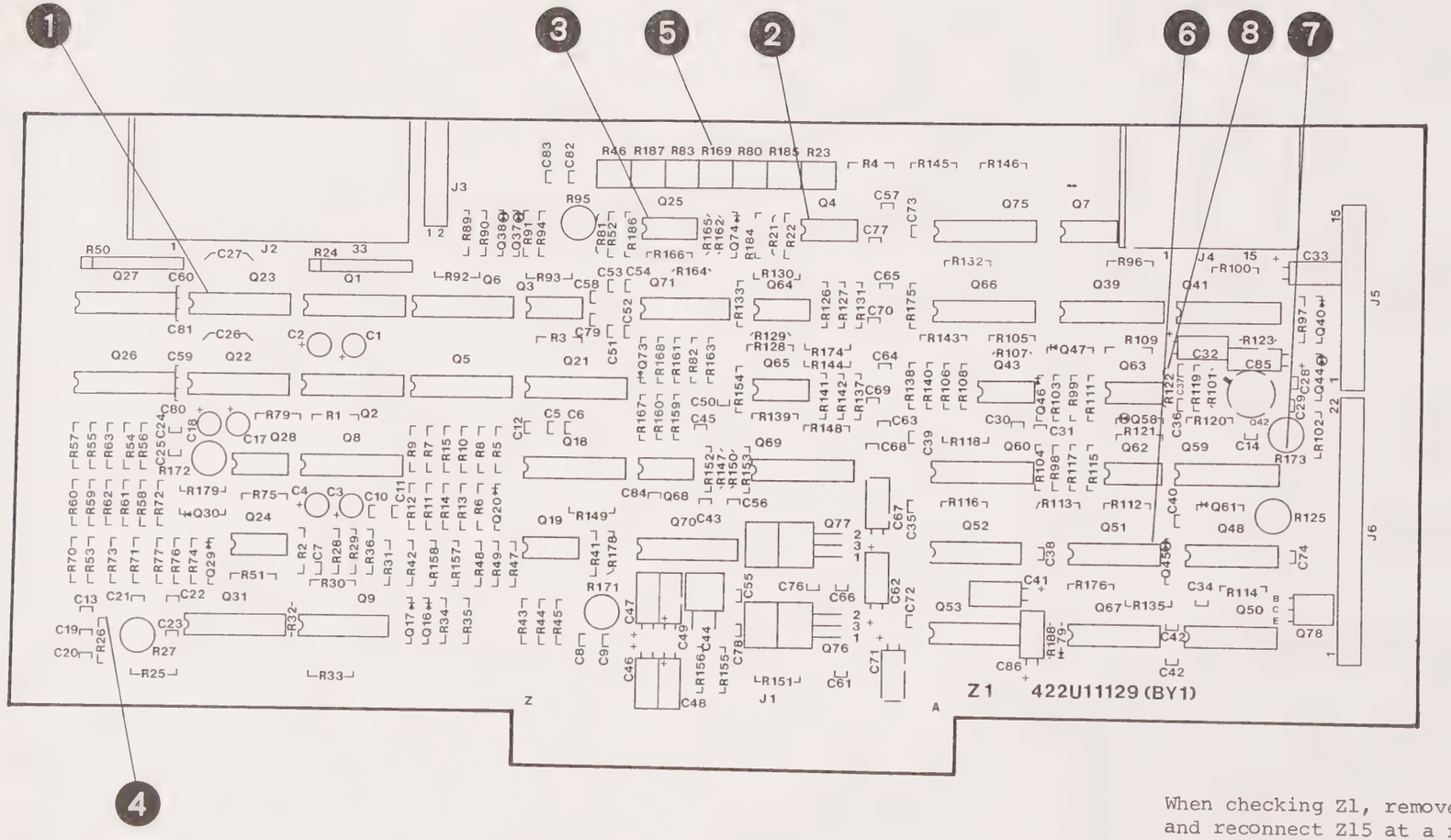
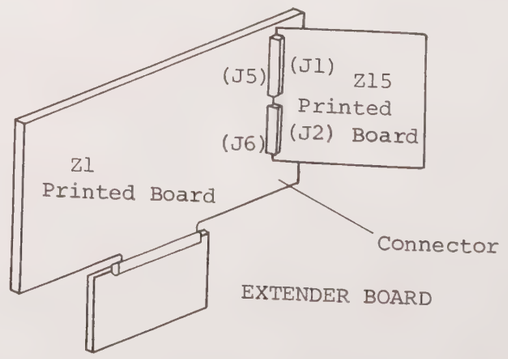
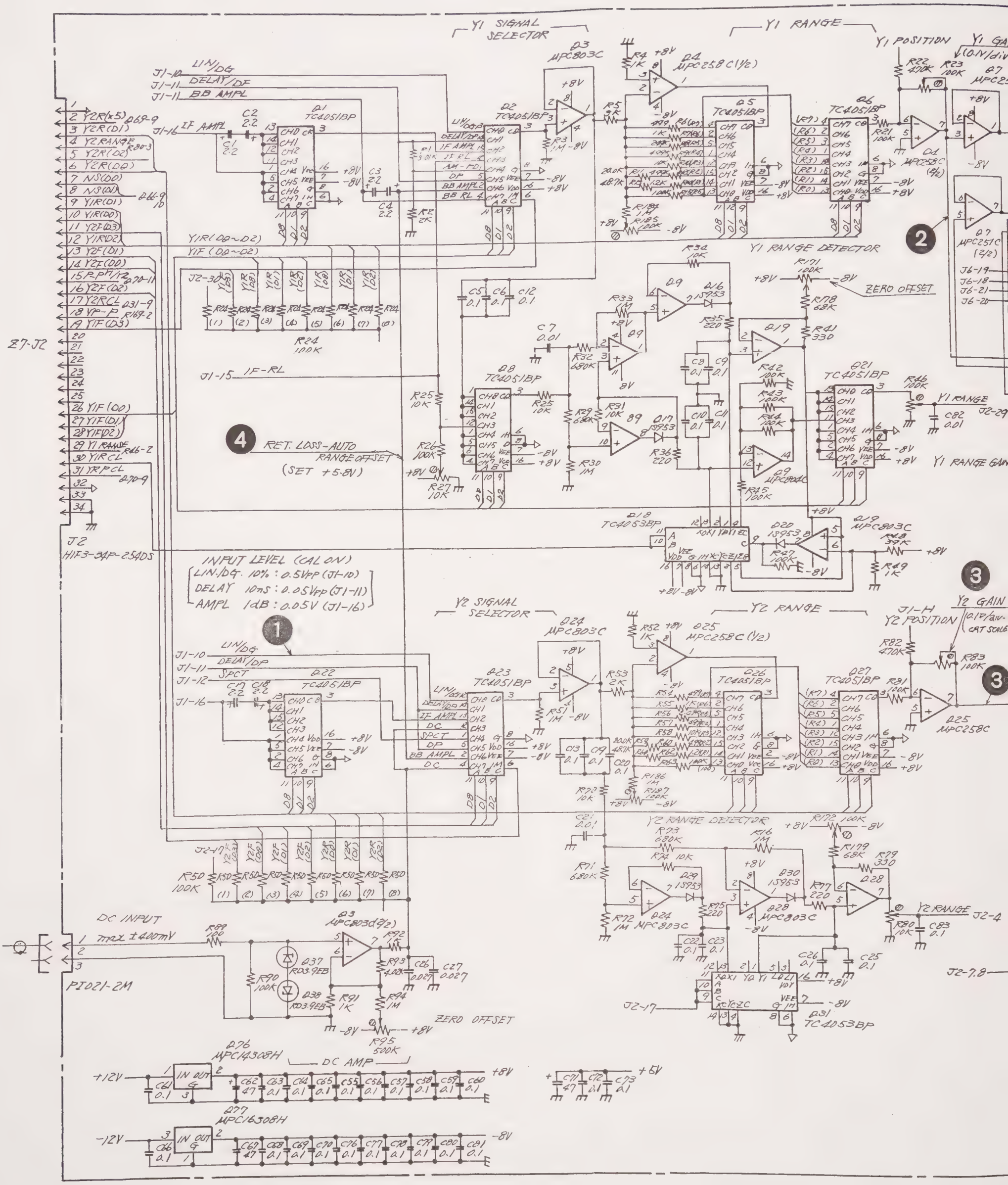
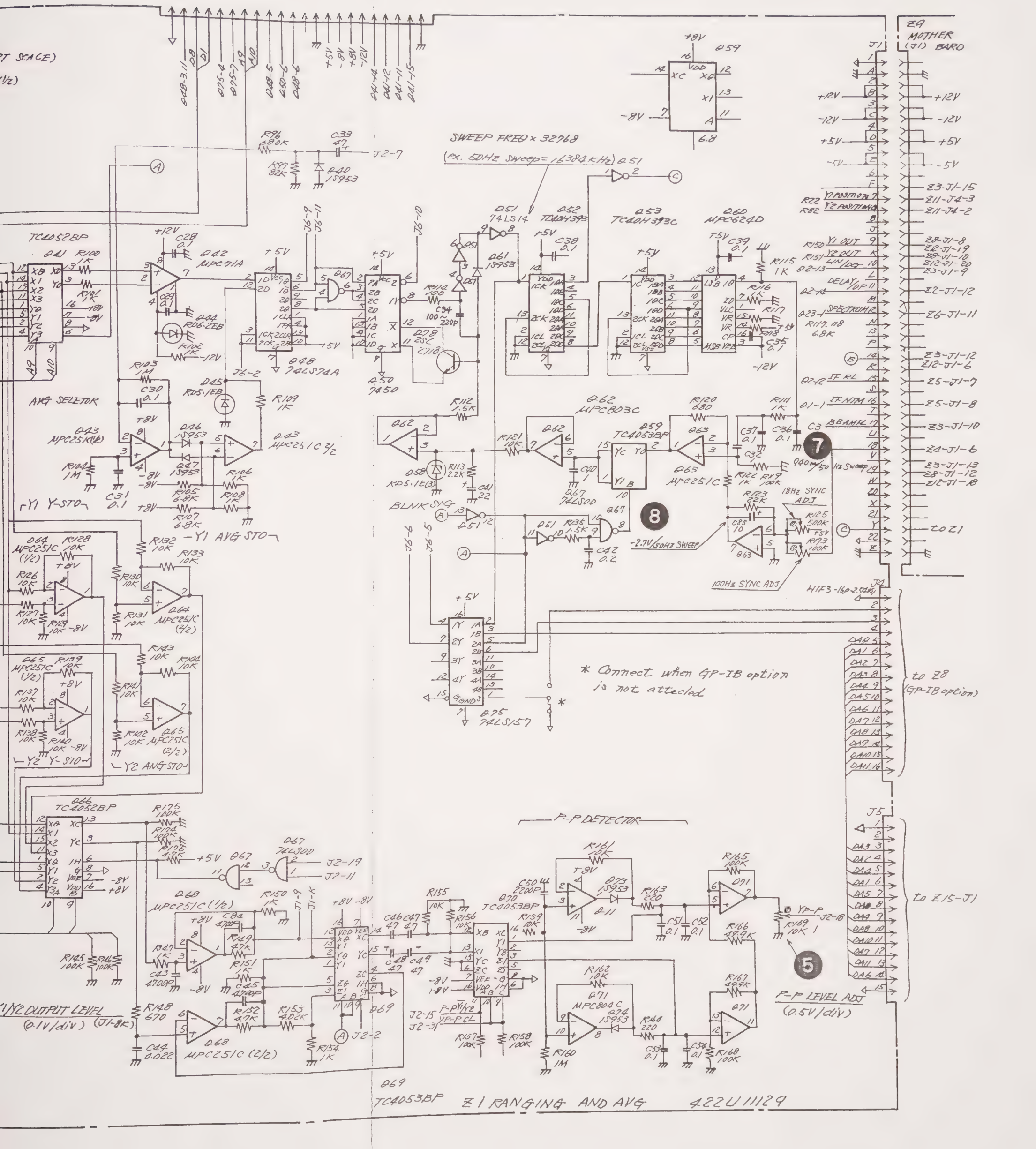


Fig. 5-32 Component Location of Z1

When checking Z1, remove Z15 from Z1 and reconnect Z15 at a right angle to Z1.




Y1 SIGNAL SELECTOR
Y1 RANGE
Y1 POSITION
Y1 GAIN
LIN/DG
DELAY/DF
BB AMPL
IF AMPL
Y2R(x5)
Y2R(D1)
Y2RANGE
Y2R(D2)
Y2R(D0)
NS(D0)
NS(D1)
Y1R(D1)
Y1R(D0)
Y2F(D3)
Y2R(D2)
Y2F(D1)
Y2F(D0)
P/P
Y2F(D2)
Y2RCL
Y1P-P
Y1F(D3)
Y1F(D0)
Y1F(D1)
Y1F(D2)
Y1 RANGE
Y1RCL
Y1RPCL
J2
HIF3-34P-2.54DS
Y1R(D0~D2)
Y1F(D0~D2)
IF-RL
RET. LOSS-AUTO RANGE OFFSET
(SET +5.8V)
ZERO OFFSET
Y1 RANGE DETECTOR
INPUT LEVEL (CAL ON)
LIN/DG. 10% : 0.5Vpp (J1-10)
DELAY 10ns : 0.05Vpp (J1-11)
AMPL 1dB : 0.05V (J1-16)
Y2 SIGNAL SELECTOR
Y2 RANGE
Y2 POSITION
Y2 GAIN
SPCT
Y2 RANGE DETECTOR
DC INPUT
max ±400mV
PI021-2M
DC AMP
+12V
-12V
+8V
-8V
+5V



Component list: Table 6-13

Fig. 5-33 CIRCUIT DIAGRAM OF Z1 RANGING AND AVG (RECEIVER) (42W11104)

5.3.4 Z2 PHASE DETECTOR

(1) Circuit description

BB FREQ DETECTOR detects the frequency of the input BB signal ❻ (J1-Y) and sends it to Z7 CPU. The BB FREQ detector also controls the BB local oscillator and frequency divider and multiplier using the frequency information.

BB input signal ❻ (J1-Y): The frequency of the BB input signal ❻ (J1-Y) is converted by the mixer (Z1) and FREQ divider and multiplier (Q17 through Q25).

Its frequencies are as shown in the following table.

Phase Detector Input Frequency

	BB input frequency		Input frequency of Phase Detector
f1	K type	66.667 kHz	200.000 kHz
	L type	92.593 kHz	277.778 kHz
	M type	83.333 kHz	250.000 kHz
f2	K type	200.000 kHz	200.000 kHz
	L type	277.778 kHz	277.778 kHz
	M type	250.000 kHz	250.000 kHz
f3	K type	400.000 kHz	200.000 kHz
	L type	555.555 kHz	277.778 kHz
	M type	500.000 kHz	250.000 kHz
f4	K type	2 MHz	277.778 kHz
	L,M type	2.4 MHz	
f5	3.58 MHz		
f6	4.43 MHz		
f7	5.6 MHz		
f8	8.2 MHz		
f9	12.39 MHz		

PLL is formed by returning the phase deviation detected by the phase detector (Q43) to VCO (Q48, Q49) via DC AMP (Q38) and LPF.

BB LOCAL OSC is the circuit for generating the signal for converting the BB higher frequency (f4 through f9) to 277.778 kHz, and its oscillating frequency is controlled by the output voltage of the phase detector (Q43).

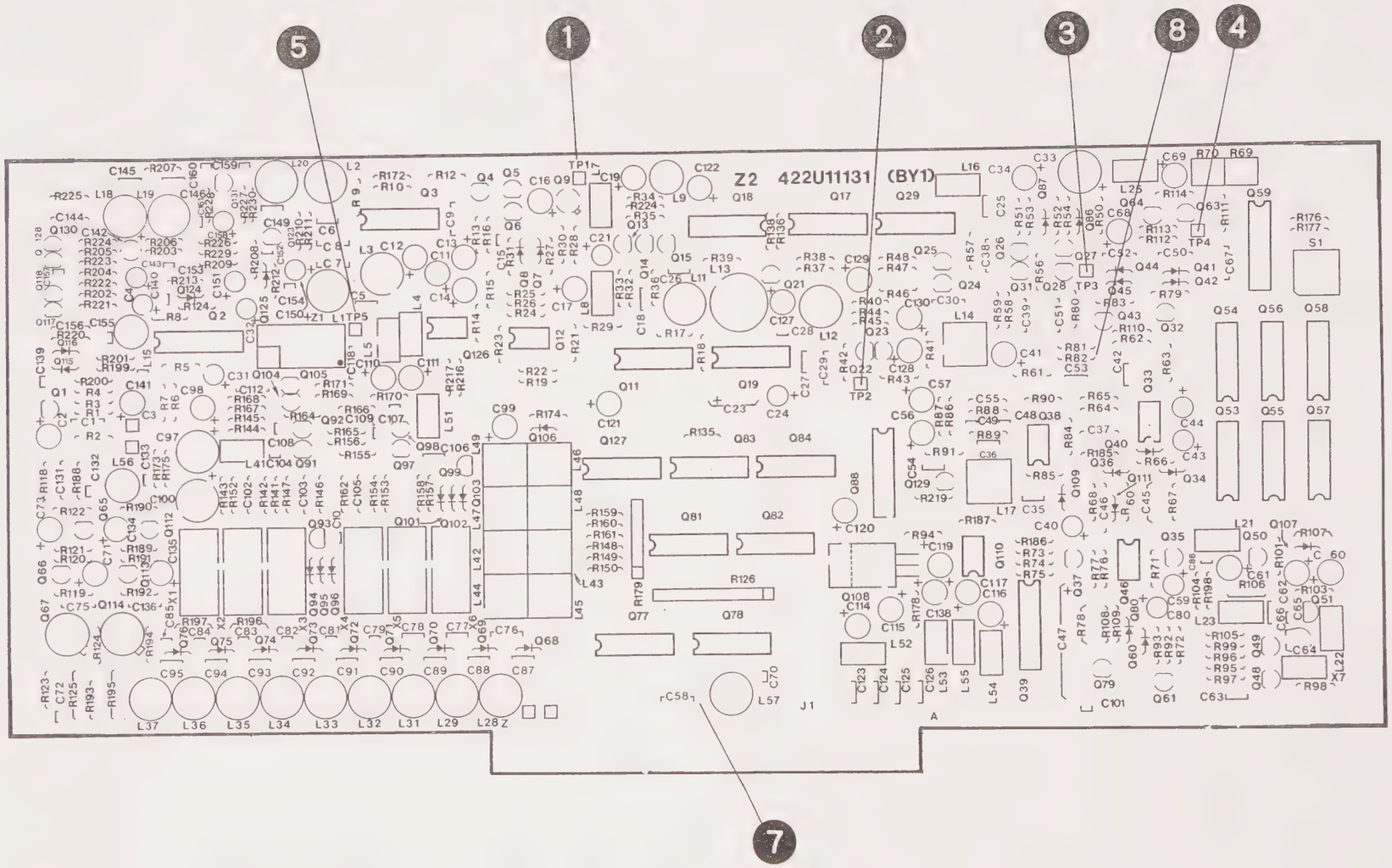
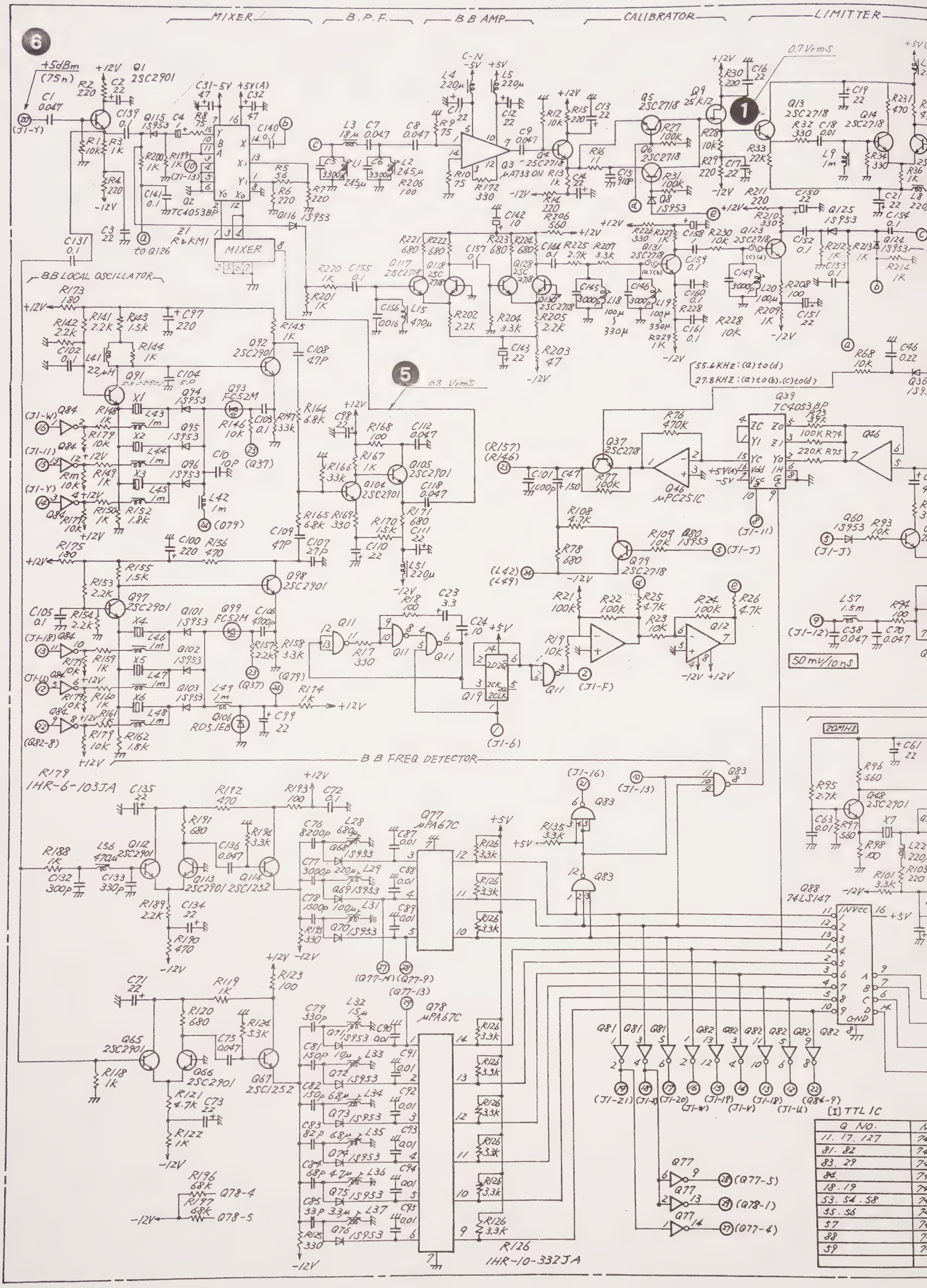
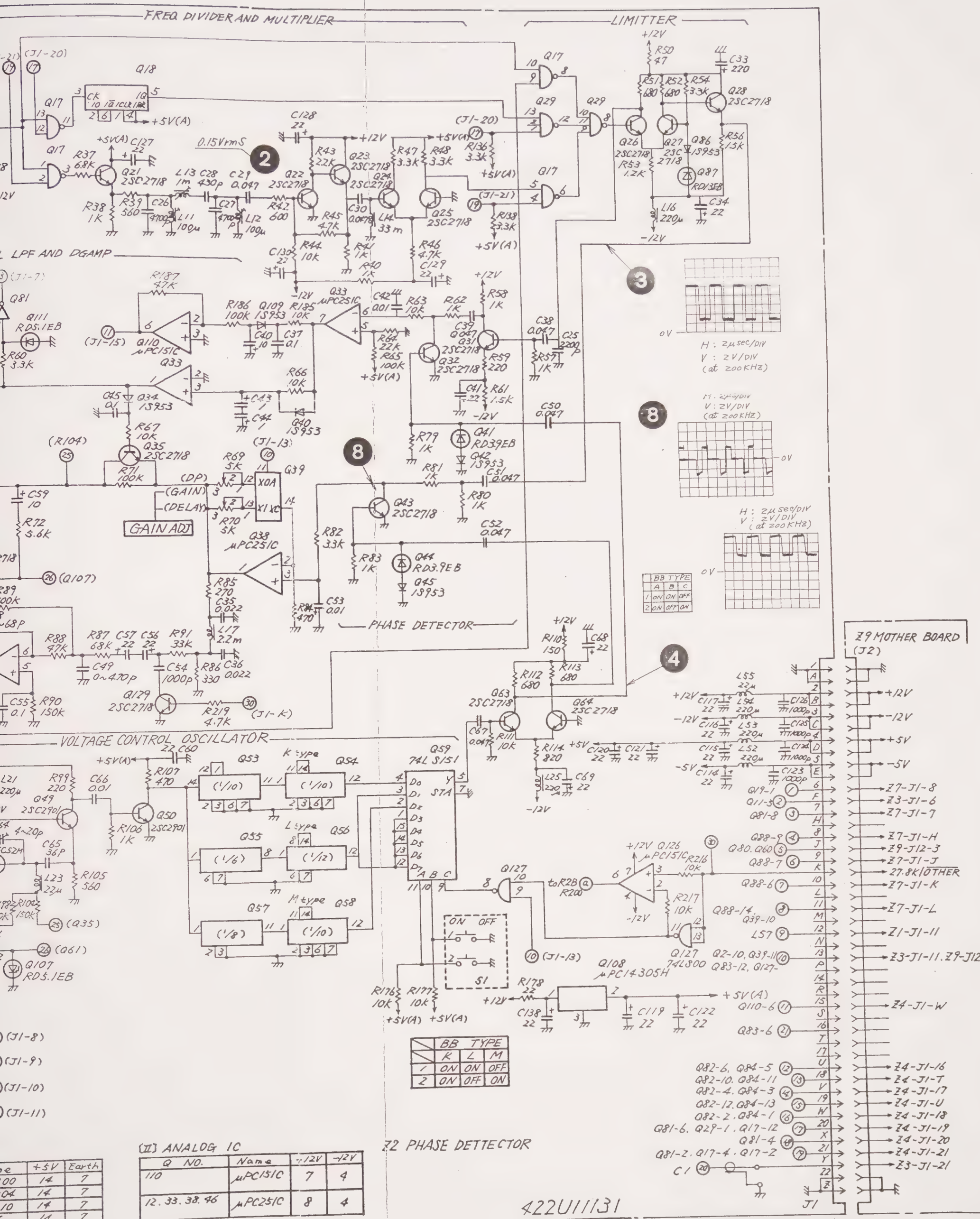


Fig. 5-34 Component Location of Z2



6
MIXER
B.P.F.
B B AMP
CALIBRATOR
LIMITTER
+5dBm
(75n)
0.7Vrms
BB LOCAL OSCILLATOR
5
0.3 Vrms
55.6KHz : (a) to (d)
27.8KHZ : (a) to (b). (c) to (d)
50mV/10nS
20MHz
B B FREQ DETECTOR
R179
1HR-6-103JA
R126
1HR-10-332JA
Q2 TC4053BP
Z1 R&KM1
Q3 μA733 ON
Q39 TC4053BP
Q46 μPC251C
Q77 μPA67C
Q78 μPA67C
Q88 74LS147
[I] TTL IC
Q NO.
11. 17. 127
81. 82
83. 29
84.
18. 19
53. 54. 58
55. 56
57
88
59



	+5V	Earth
00	14	7
04	14	7
10	14	7
	14	7
74A	14	7
90	5	10
92	5	10
93	5	10
147	16	8
151	16	8

(II) ANALOG IC

Q NO.	Name	+12V	-12V
110	μPC151C	7	4
12. 33. 38. 46	μPC251C	8	4

Z2 PHASE DETTECTOR

422U11131

Component list: Table 6-14

Fig. 5-35 CIRCUIT DIAGRAM OF Z2 PHASE DETECTOR (RECEIVE (42W11105)

5.3.5 Z3 BB DETECTOR

(1) Circuit description

This circuit consists of the BB level detector, linearity (DG) detector, and BB amplitude detector.

BB attenuator is automatically set by the control signal from Z7 CPU so that the deviation of the BB signal level is within ±1.0 dB at the input of the BB level detector.

Level Detector is a root-mean-square detect or that uses diodes having square-law detection characteristics (Q93, Q94).

This level detector is used for both the BB and IF bands.

In addition, the detection sensitivity is automatically calibrated by the reference oscillator which is controlled by Z7 CPU.

Linearity (DG) detector consists of a dc feedback type fullwave detector circuit (Q27).

PEAK AGC detects the peak value (Q28) of the detected linearity (DG) signal, controls the variable attenuator (Q27, Q34) to keep the value always constant, and to form a loop.

BB AMPL section consists of the DC amplifier of BB AMPL, logarithm amplifier, HOR circuit, and marker circuit.

HOR SIGNAL is obtained by converting the frequency of the input signal to voltage using the pulse count discriminator (Q55 through Q58) and further converting it to logerithm using the logarithm amplifier (Q63).

MARKER detects the frequency of the input signal using the tuning circuit and sends it to the CRT.

The tuning frequency is as shown below.

	f1	f2	f3	f4	f5	f6	f7
Frequency	60kHz	100kHz	300kHz	1.0MHz	3.0MHz	10.0MHz	15MHz
Circuit	C60 L18	C62 L19	C64 L20	C66 L21	C68 L22	C70,71 L23	C73,74 L24

(2) Repair

1. BB INPUT LEVEL display is abnormal

Set RECEIVER MODE to BB.

Apply the BB signal (0 dBm) to BB INPUT.

case 1 → BB ATTENATOR and BB AMPLIFIER are abnormal

Check the levels at C14 and ❶.

case 2 → BB LEVEL DETECTOR is abnormal

Check the voltages at Q21-7 and ❷.

2. Linearity and DG can not be measured

Set RECEIVER MODE to BB.

Apply the BB signal (0 dBm) to BB INPUT.

case 1 → BB INPUT LEVEL display is abnormal

Check item (1).

case 2 → LINEARITY DETECTOR and AGC AMP are abnormal

Check the vaoltages of ❸ and ❹.

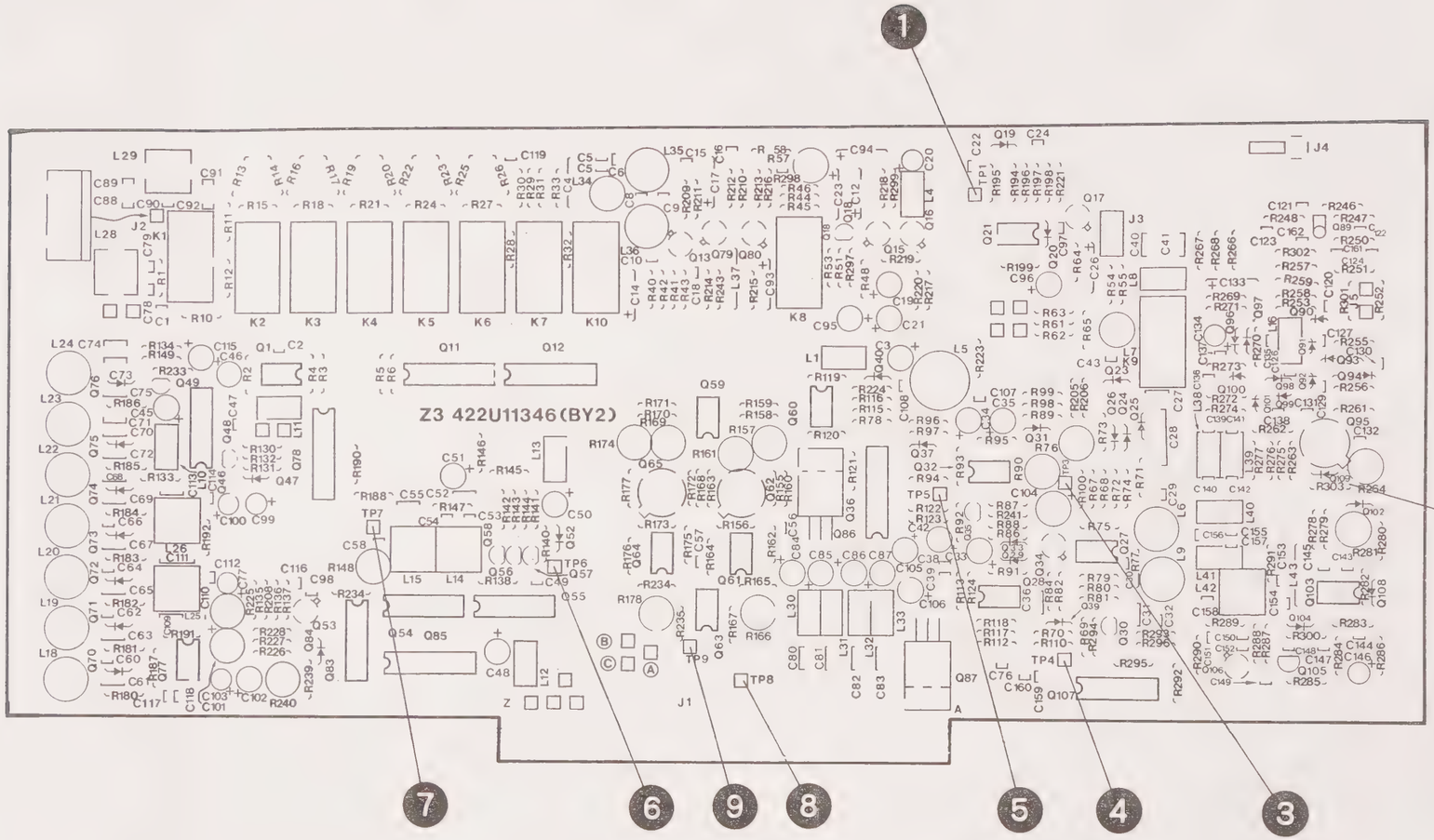
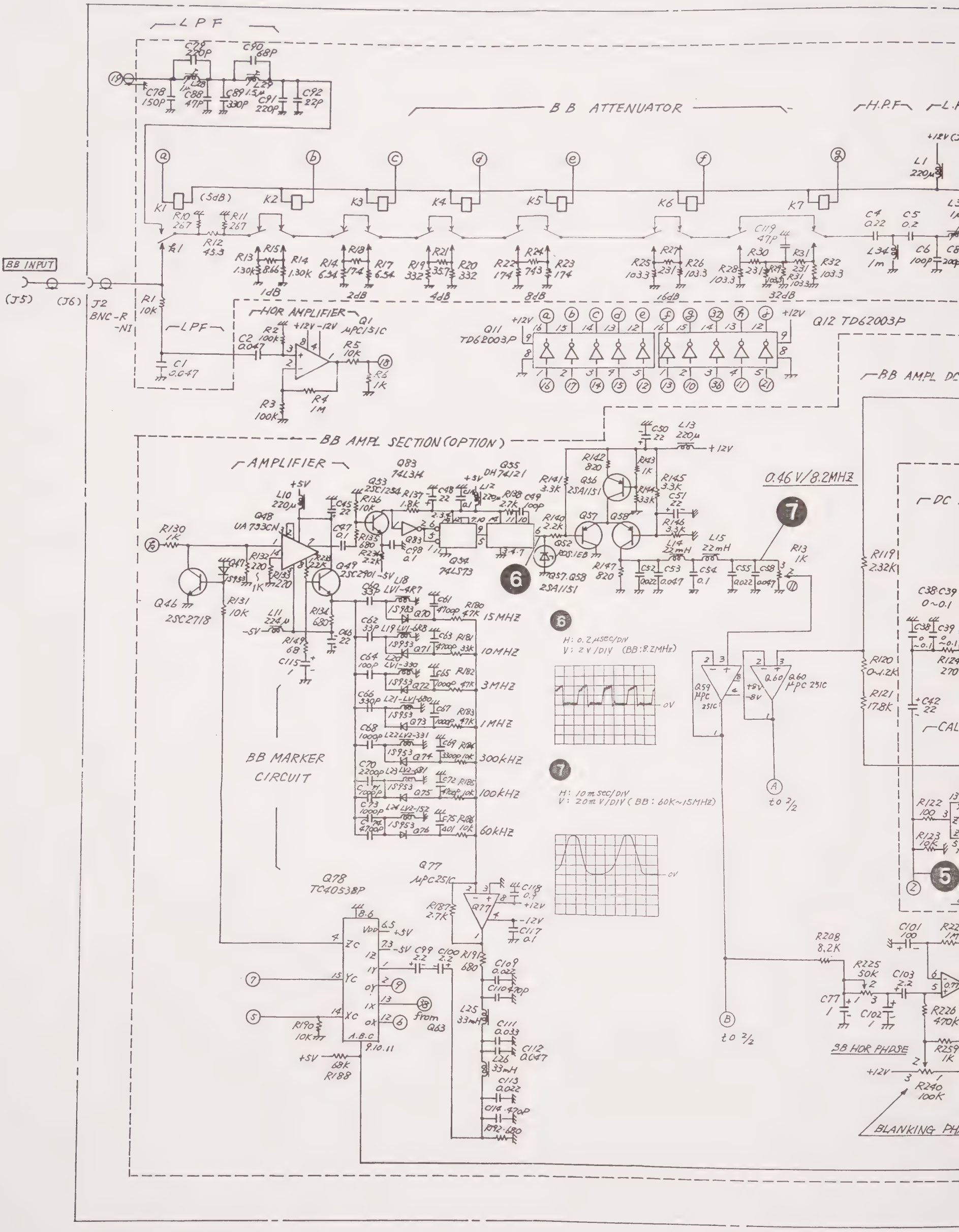
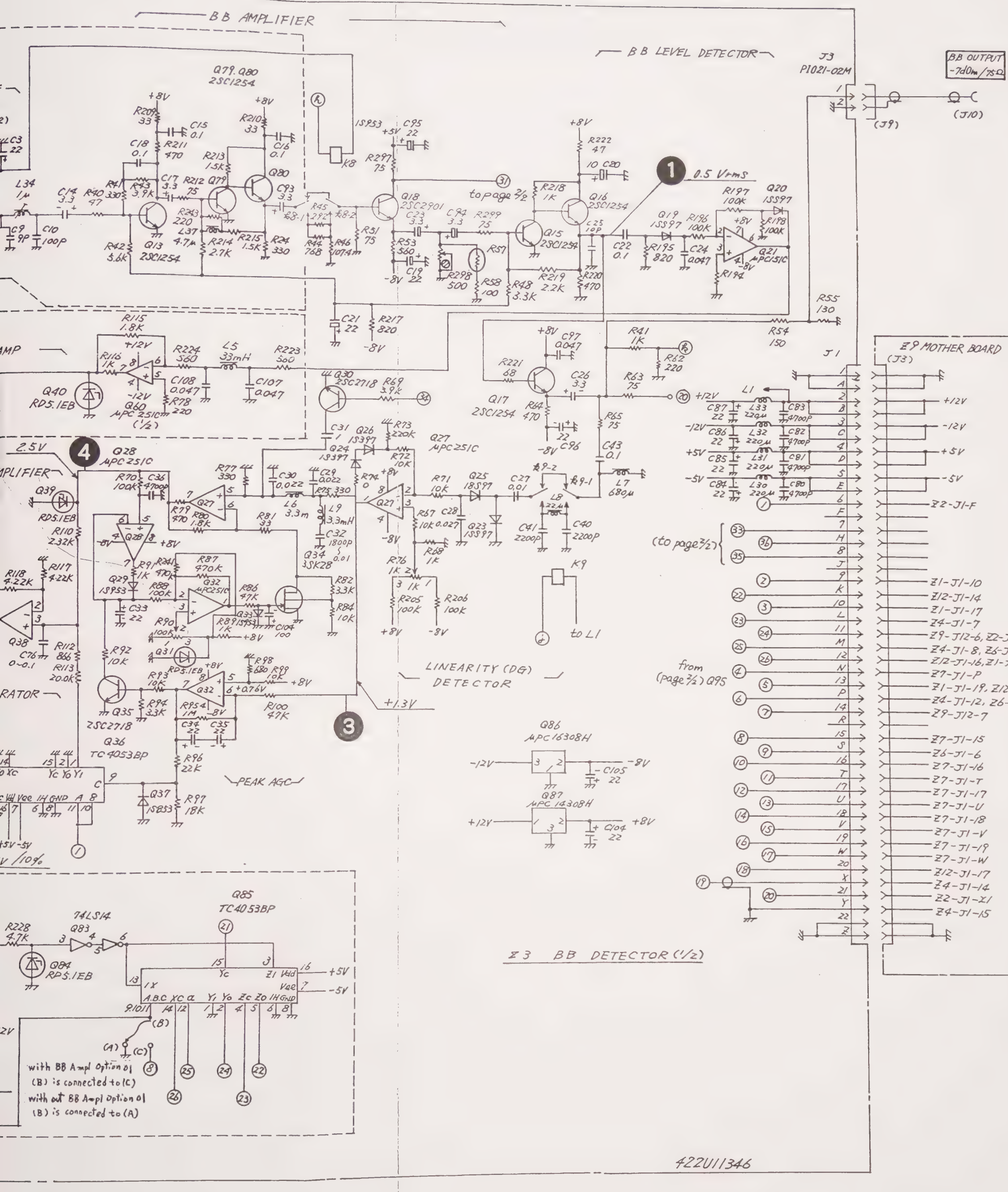


Fig. 5-36 Component Location of Z3


LPF
C78 150P
C88 47P
C89 330P
C90 68P
C91 220P
C92 22P
L28 1m
L29 1.5μ
BB ATTENUATOR
H.P.F
L.P.F
BB INPUT
(J5)
(J6)
J2 BNC-R -NI
R1 10k
C1 0.047
K1
(5dB)
K2
K3
K4
K5
K6
K7
R10 267
R11 267
R12 45.3
R13 1.30k
R14 1.30k
R15 8.66
1dB
R16 6.34
R17 6.54
R18 174
2dB
R19 332
R20 332
R21 35.7
4dB
R22 174
R23 174
R24 743
8dB
R25 103.3
R26 103.3
R27 231
16dB
R28 231
R29 103.3
R30 231
R31 103.3
R32 103.3
32dB
C119 47P
L1 220μ
+12V
C4 0.22
C5 0.2
L34 1m
C6 100P
HOR AMPLIFIER
Q1 μPC151C
R2 100k
C2 0.047
R3 100k
R4 1M
R5 10k
R6 1k
+12V -12V
Q11 TD62003P
Q12 TD62003P
BB AMPL SECTION (OPTION)
AMPLIFIER
Q83 74L34
Q35 DH74121
Q53 2SC1254
Q48 UA733CN
Q49 2SC2901
Q46 2SC2718
Q47 1S953
Q34 74LS73
Q52 RDS:1EB
Q57,Q58 2SA1151
Q56 2SA1151
R130 1K
R131 10K
R132 220
R133 1K
R134 680
R135 680
R136 10K
R137 1.8k
R138 2.7k
R139 2.2k
R140 2.2k
R141 3.3k
R142 820
R143 1K
R144 33K
R145 3.3k
R146 3.3k
R147 820
R148 2.2k
R149 68
C45 22
C47 0.1
C48 22
C49 100P
C50 22
C51 22
C52 0.022
C53 0.047
C54 0.1
C55 0.022
C58 0.047
L10 220μ
L11 224μ
L12 220μ
L13 220μ
L14 22mH
L15 22mH
+12V
-5V
+5V
C115 1
L18
L19
L20
L21
L22
L23
L24
L25 33mH
L26 33mH
LV1-4R7
LV1-6R8
LV1-330
LV1-680
LV2-331
LV2-681
LV2-152
15MHZ
10MHZ
3MHZ
1MHZ
300kHZ
100kHZ
60kHZ
BB MARKER CIRCUIT
Q77 μPC251C
Q78 TC40538P
R187 2.7k
R188 68k
R189 10K
R190 10K
R191 680
R192 680
C99 2.2
C100 2.2
C109 0.022
C110 470P
C111 0.033
C112 0.047
C113 0.022
C114 470P
C118 0.1
C117 0.1
from Q63
0.46 V/8.2MHZ
H: 0.2μsec/DIV
V: 2V/DIV (BB:8.2MHz)
H: 10msec/DIV
V: 20mV/DIV (BB: 60K~15MHz)
Q59 μPC 251C
Q60 μPC 251C
+5V -8V
to 2/2
DC
CAL
R119 2.32K
R120 0~1.2K
R121 17.8K
C38·C39 0~0.1
R124 270
C42 22
R122 100
R123 10K
R208 8.2K
R225 50K
C103 2.2
C77 1
C102 1
C101 100
R226 470K
R259 1K
R240 100K
BB HOR PHASE
BLANKING PH



Component list: Table 6-15

Fig. 5-37 CIRCUIT DIAGRAM OF Z3 BB DETECTOR (RECEIVER) (42W11106, 1/2)

from Z5

J4

IF INPUT
-19dBm

C121
4700P

R246
50.0

+12V

R252
68

C124
4700P

R251
330

R250
267

-12V

R247
1K

C122
4700P

R248
3.3K

C123
4700P

C163
0~7P

R302
50.0

R259
44.8

R257
131

R258
33

R253
1K

C120
4700P

Q90
1S2222

@

C126
4700P

L16
10μH

Q92
1S2222

Q91
1S2222

R255
1K

C127
4700P

C129
0.1

Q94
1SS78

R256
1K

Q93
1SS78

Q89
2SC2148

to Z6

J5

BB INPUT
-20dBm

R301
50.0

C161
0.1

from 1/2 page

31

+12V

C128
0.1

Q88
2SC2901

R267
100

R266
390

C133
3.3

Q96
1S953

R269
1K

b

C135
0.1

R270
1K

Q98
1S953

Q97
1S953

R271
1K

C134
1

c

C136
4700P

R272
1K

Q99
1S2222

Q101
1S2222

Q100
1S2222

C137
4700P

R273
1K

Q104
1SS97

+12V

C144
1000P

R300
100K

C147
100P

C148
7P

C149
1000P

R284
100K

R285
1K

R287
10K

Q103
μPC251C

Q102
1SZ47A

C143
0.01

Q108
1SS97

R283
100K

R282
7.5K

C145
1000P

C146
4.7

R286
215

Q105
FC51M

C150
4700P

R279
4.99K

R280
4.64K

R281
1K

R278
5.11K

-12V

+12V

Q107
μPC451C

+12V (J1-2)

C159
0.1

R292
10K

R293
10K

R294
10K

C160
0.1

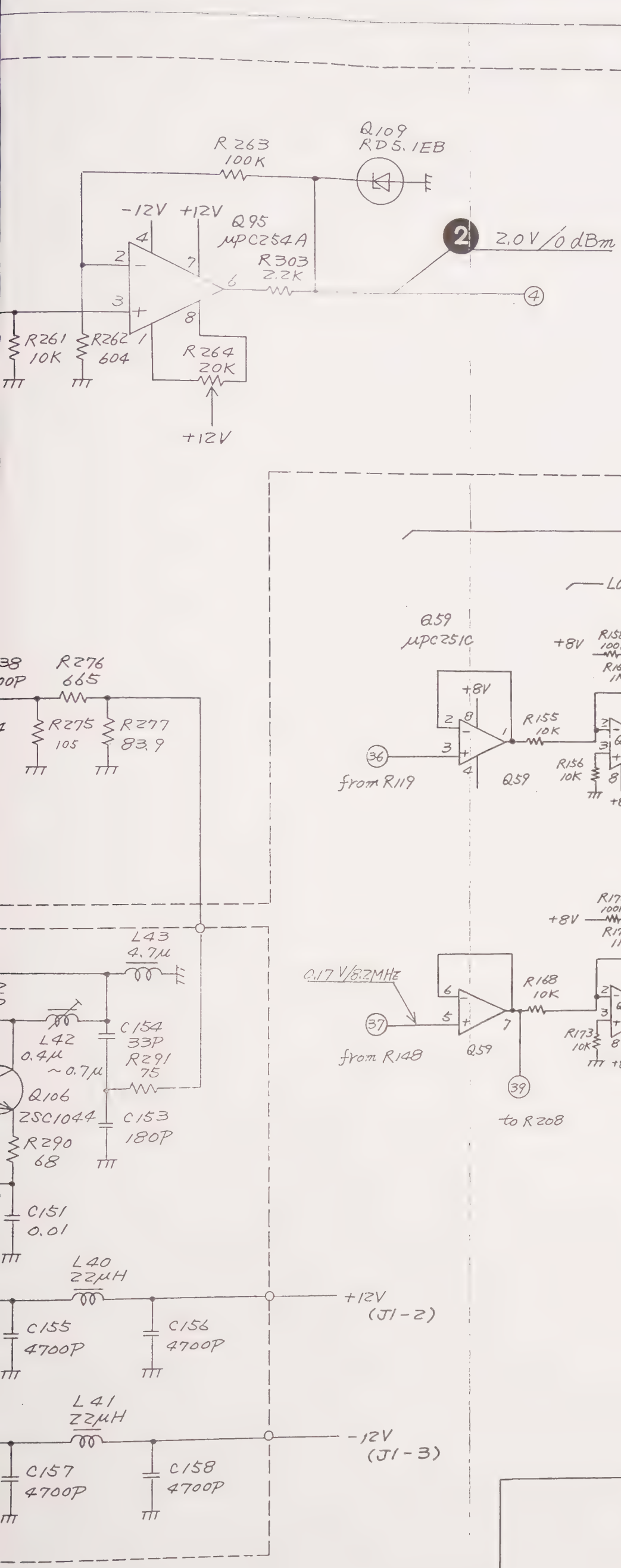
-12V
(J1-3)

R296
10K

R295
2.2K

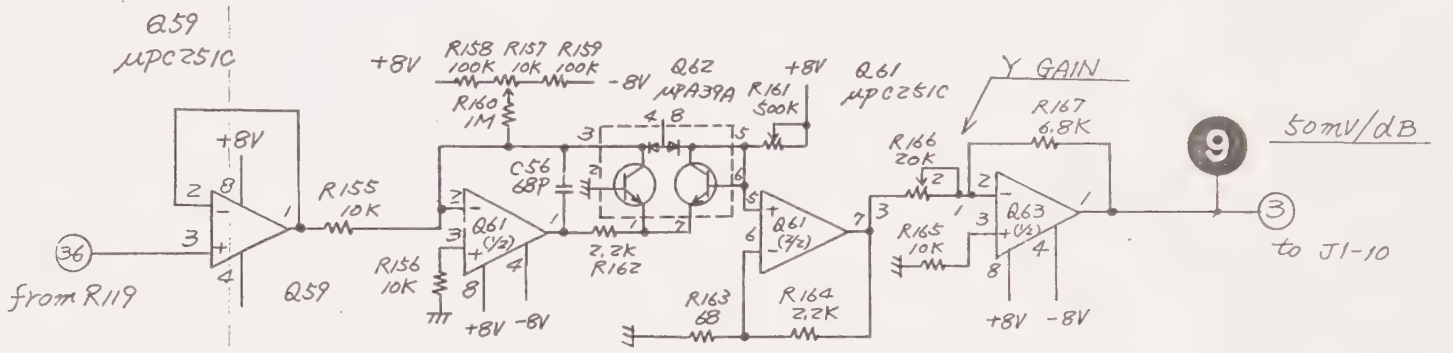
+12V
(J1-2)

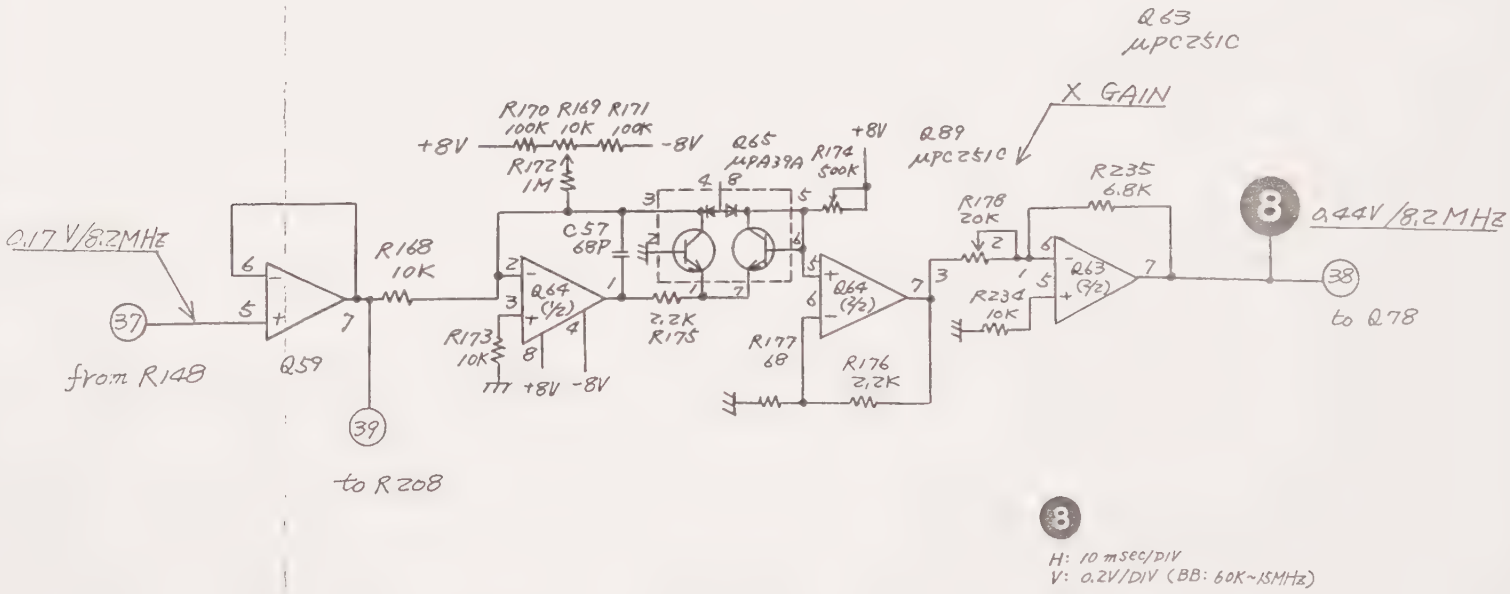
-12V

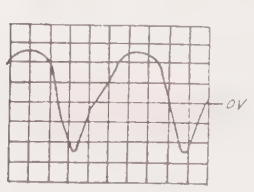


BB AMPL (OPTION)

LOGARITHM AMPLIFIER







Z3 BB DETECTOR (2/2)

422U11346

Component list: Table 6-15

Fig. 5-37 CIRCUIT DIAGRAM OF Z3 BB DETECTOR (RECEIVER) (42W11106, 2/2)

5.3.6 Z4 DISCRIMINATOR

(1) Circuit description

This circuit consists of a discriminator which demodulates the BB signal from 17.78 MHz IF signal, pulse count detector for AFC, and HOR signal generator.

17.78 MHz IF signal: The spurious of the 17.78 MHz IF signal is removed by the low pass filter (L27, L28), the AM components of the 17.78 MHz IF signal are removed by the limiter (Q28), and the BB signal is demodulated by the discriminator (Q1 through Q3).

BB signal: The spurious of the BB signal is removed by the low pass filter (L7 through L9) and the BB signal is sent to Z3 BB detector via the BB amplifier (Q6, Q7) and tuning circuit.

AFC LOOP is formed by converting the frequency of the 17.78 MHz IF signal to voltage using the pulse count discriminator (Q43 through Q46) and returning the signal to the local oscillator (Z5) via DC amplifier (Q55).

HOR signal generator is the circuit for generating the HOR signal synchronized with the sweep signal.

PLL is formed by detecting the phase deviation of the output signal of the voltage control oscillator for the sweep signal with the phase detector (Q54, Q67) that uses the sample hold circuit and returning the signal to VCO via DC amplifier (Q63, Q64).

(2) Repair

1. AFC circuit does not operate

Ground ❼ .

Apply the 70 MHz, 0 dBm signal to IF INPUT.

case 1 → LIMITER is abnormal.

Check the level of ❷ .

case 2 → P.C.D is abnormal.

Check the level of ❺ , pulse-width of ❻ , and voltage of R116.

→ AFC LOOP is abnormal.

Disconnect ❼ from the ground line, and adjust R142 checking the voltage of ❼ .

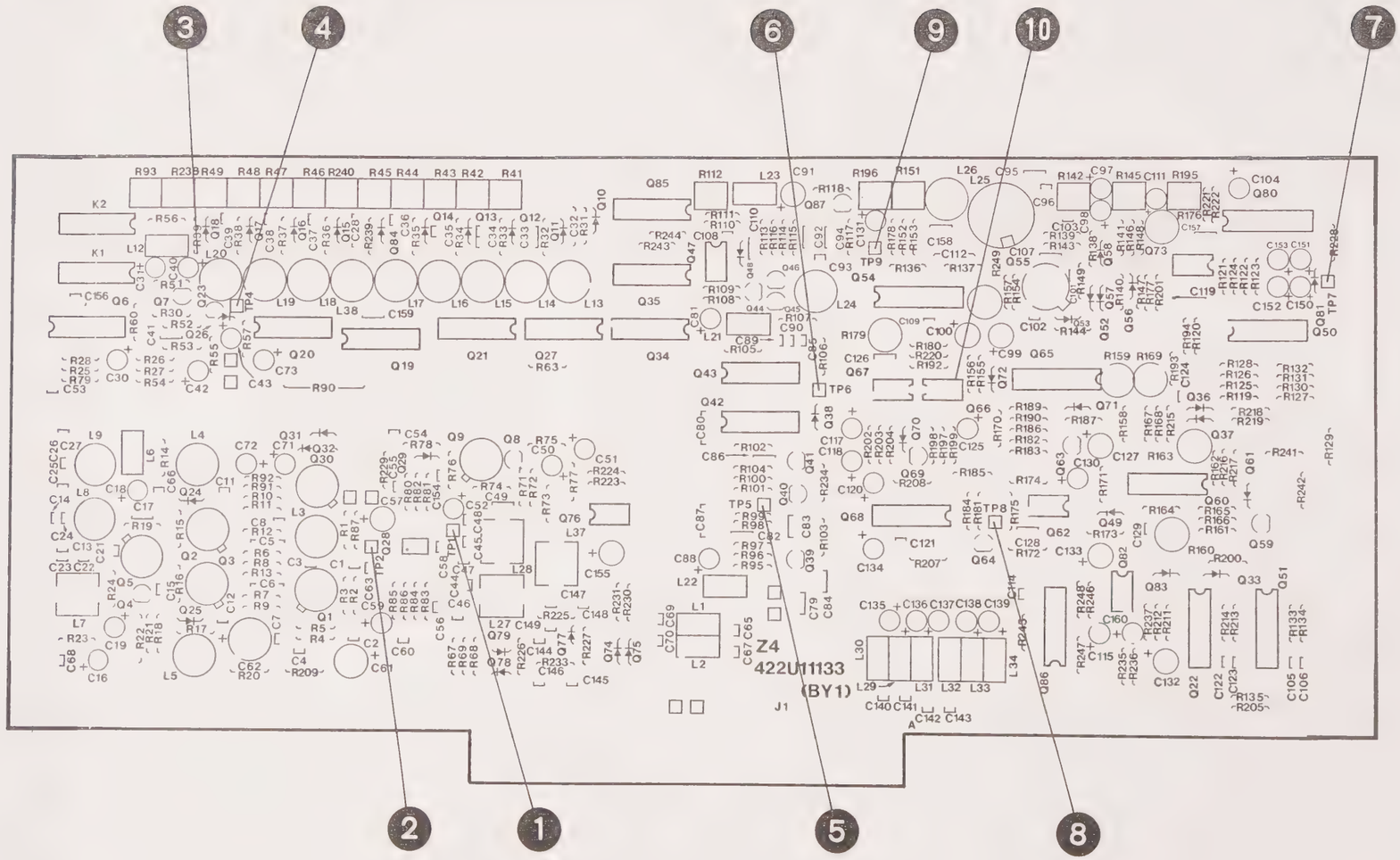


Fig. 5-38 Component Location of Z4

LOW PASS FILTER

LIMITER

SIGNAL = 0.85Vpp
BIAS = -1.414VDC

1.0 Vpp

P. C. D

5 H: 50μS/DIV
V: 2V/DIV

6 H: 2μS/DIV
V: 2V/DIV

PCD SENSE

SEARCH CENTER

SPECTRUM

HOR PHASE

SWEEP WIDTH

HOR SYNC ADJ
(18Hz)

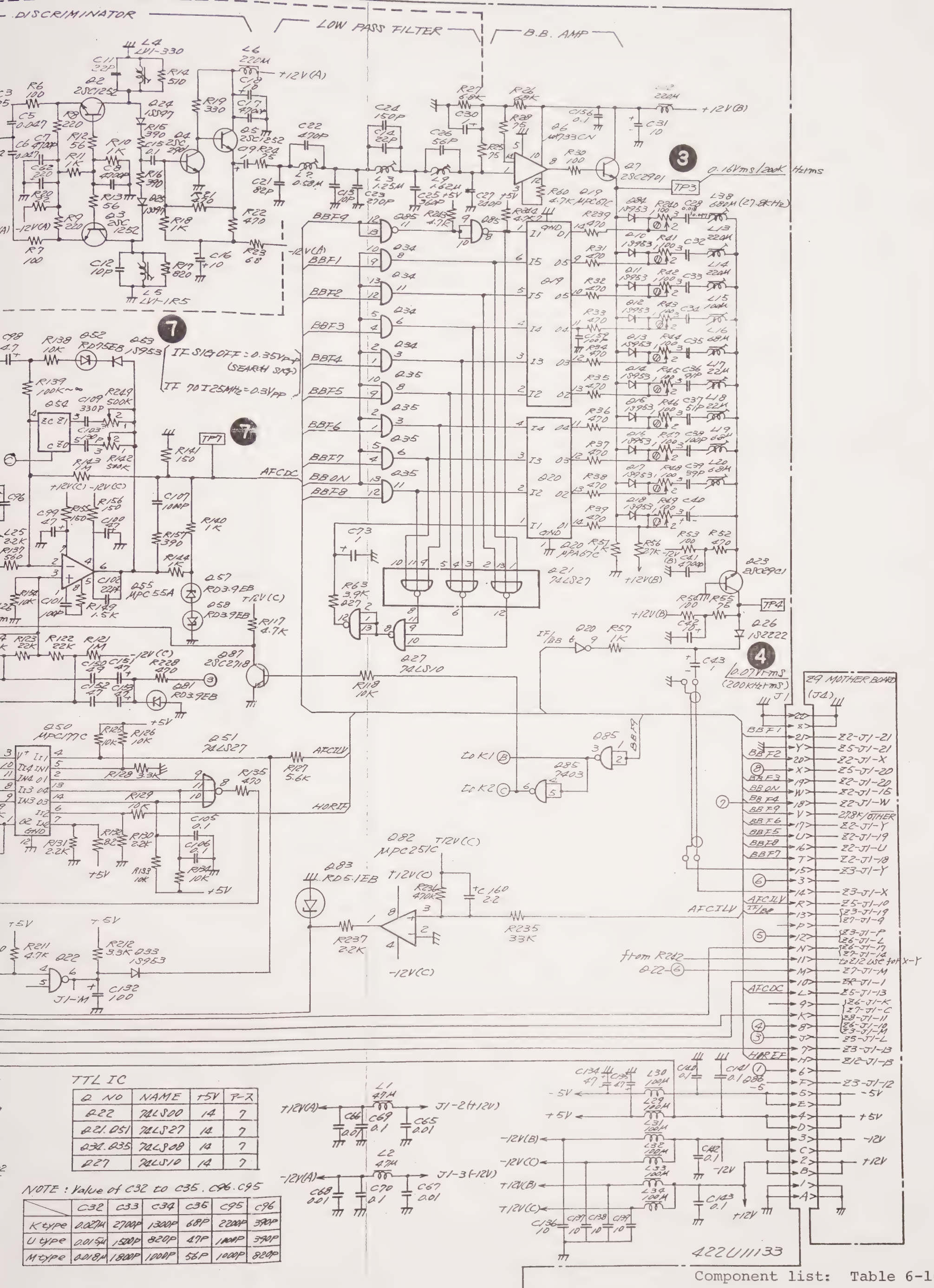
HOR SYNC ADJ
100Hz

HOR PHASE CONTROL (IF MODE)

AM-PM ADJ

HOR PCD

HOR SIGNAL GENERATOR



TTL IC

Q NO	NAME	+5V	P-7
Q22	74LS00	14	7
Q21. Q51	74LS27	14	7
Q30. Q35	74LS08	14	7
Q27	74LS10	14	7

NOTE : Value of C32 to C35. C96. C95

	C32	C33	C34	C35	C95	C96
K type	0.027μ	2700P	1300P	68P	2200P	390P
U type	0.015μ	1500P	820P	47P	1000P	390P
M type	0.018μ	1800P	1000P	56P	1000P	820P

Component list: Table 6-16

Fig. 5-39 CIRCUIT DIAGRAM OF Z4 DISCRIMINATOR (RECEIVER) (42W11107)

5.3.7 Z5 IF MIX AND RETURN LOSS

(1) Circuit description

This circuit consists of the IF local oscillator, IF level detector, IF amplitude detector, and IF return loss detector.

IF signal is set to a fixed by the IF attenuator (K1 through K3) which is controlled by Z7 CPU and is sent to the mixer (Z1) via the pre-amplifier (Q5, Q6).

IF local oscillator (Q14, Q15) is a voltage control oscillator for oscillating the following frequencies:

70 MHz band: 87.78 ±25 MHz or more
140 MHz band: 122.22 ±50 MHz or more

The IF local oscillator is controlled by the AFC loop to keep the frequency of the 17.78 MHz IF signal of the mixer (Z1) output constant.

17.78 MHz IF signal is sent to the AGC circuit (Q45 through Q55) via the amplifier (Q27) after its spurious having been removed by the LPF (L9 through L11).

IF amplitude detector (Q56 through Q64) uses a detector (Q58) of stable dc feedback type, which converts the detected signal to logarithm using the logarithm amplifier (Q59) and sends it to the CRT.

IF return loss circuit consists of a mixer (Z2) for converting the IF input signal to 17.78 MHz signal, return loss offset amplifier, and level detector.

Return loss offset amplifier (Q71 through Q85): The gain of this amplifier is set by the control signal of Z7 CPU.

(2) Repair

1. **AFC circuit does not operate**

   Apply the 70 MHz, 0 dBm signal to J2.
   Remove Z4 P.C. Board.
   Set the IF BAND select switch to 70 MHz.

   - case 1 → **IF ATTENUATOR and IF PRE-AMP are abnormal**
     Check the voltage of ❶.
   - case 2 → **17.8 MHz AMP is abnormal.**
     Check the levels of ❷ and ❸.
   - case 3 → **AGC does not operate**
     Check the level of ❻.
   - case 4 → **AFC circuit does not operate**
     Check Z4.

2. **IF Amplitude can not be measured.**

   Apply the 70 MHz, 0 dBm signal to J2.

   - case 1 → **AFC circuit does not operate**
     Check item (1).
   - case 2 → **IF AMPLITUDE DETECTOR is abnormal.**
     Check the voltages of ❼ to ❿.

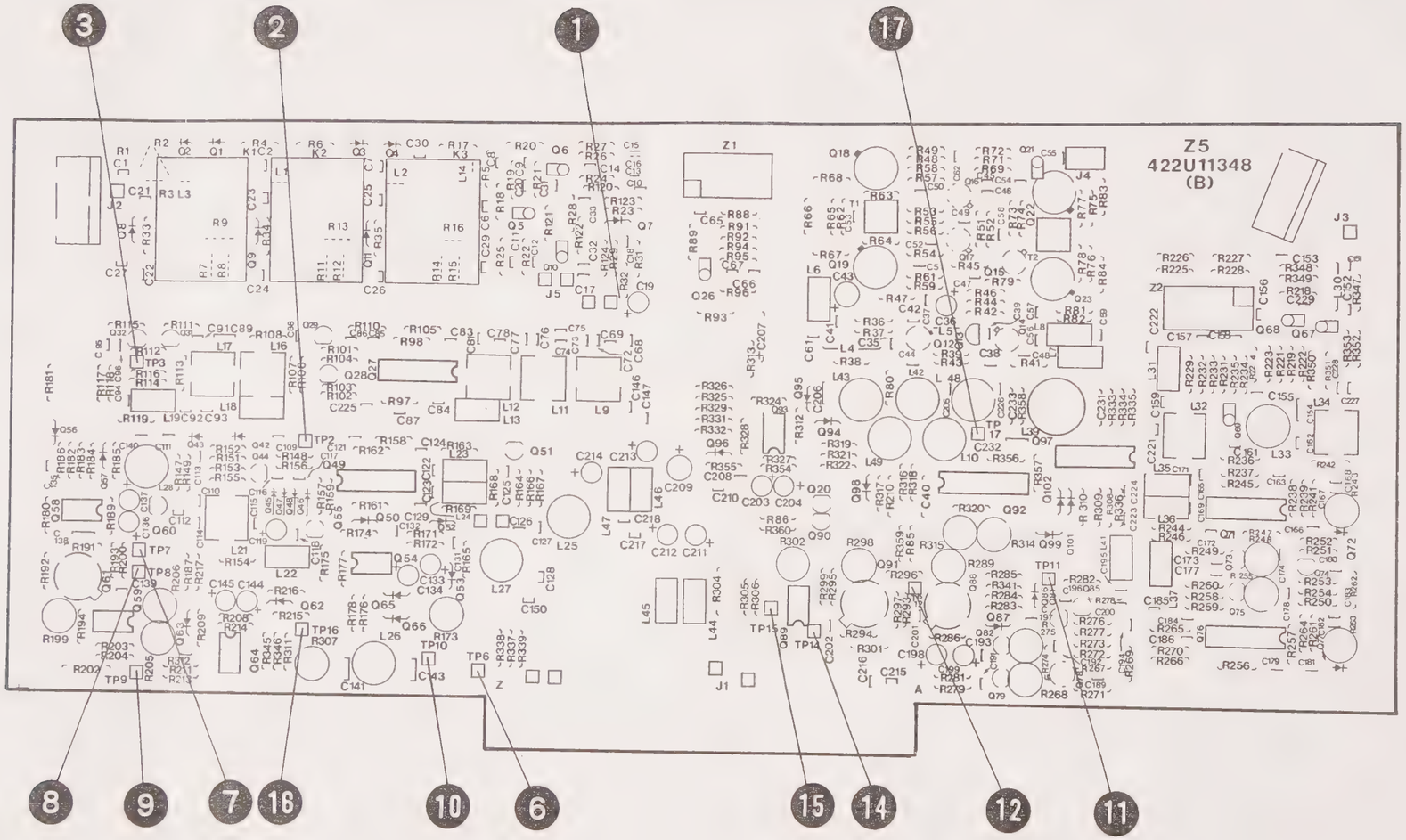
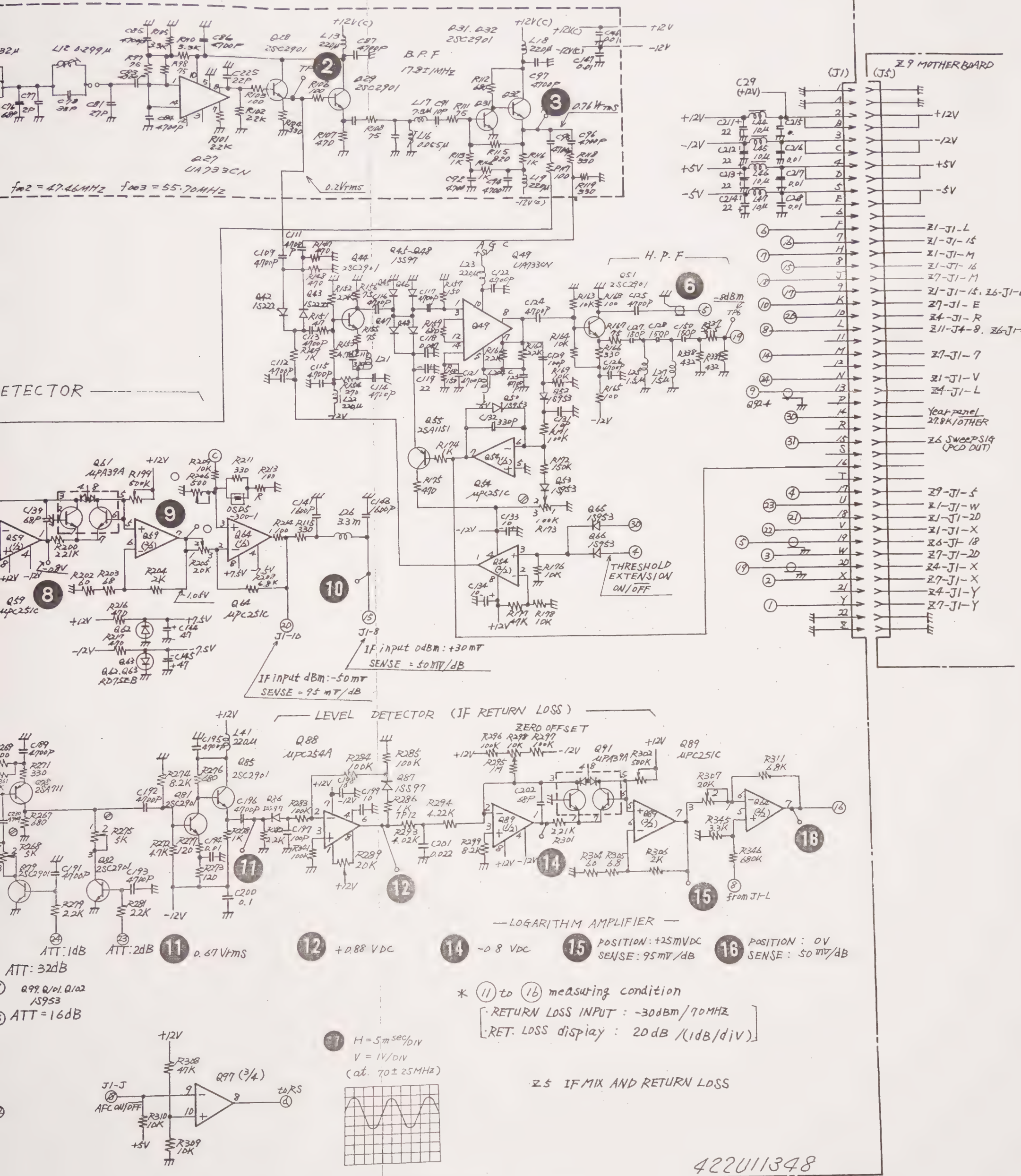


Fig. 5-40 Component Location of Z5

IF ATTENATOR
IF PRE-AMP
MIXER
IF INPUT
(J1)
J2 BNC-R601 -NI
from Q97
K1~K3 +12V(A) SF-102T
J1-2 (+12V)
-12V
from J1
-17.5dBm / INPUT: 0dBm
MIXER
from R66
Q5. Q6 2SC2368
Q26 2SC2368
L9 0.416μ
fo01 = 91.83M
10mV/0dBm input
IF LOCAL OSCILLATOR
Q12 2SC1214
Q14 Q15 2SC1214 2SC1214
Q16 Q17 2SC454 2SC454
Q18. Q19 2SC1252
T1
T2
L6 220μ
L7 220μ
from R324
J4 27DP-LR-PC
TO X6-J2 (for MARKER)
Q20 2SC2718
Q21 2SC2368
Q22. Q23 2SC1252
J3 BNC-R601-NI
IF AMPL
Q56 1SS97
Q57 1SS97
Q58 (1/2) (3/4)
Q60 2SC2718
from J1-14 μPC251C
+0.92 Vdc
Q67. Q68 2SC2148
Q69 2SC2148
Q71 UA733CN
Q76 UA733CN
Q73 2SC2901
Q74 2SC2901
Q75 2SC2901
—B.P.F—
RETURN LOSS OFFSET AMP
RETURN LOSS INPUT
(J3)
Z2 R2KM7
MIXER
ATT:4dB
ATT:8dB
Q92 TC40538P
LOCAL OSC OFFSET
20MHz BAND
140MHz BAND
Q93 (1/2) (2/4) (3/4)
Q93 μPC25IC
Q94 1S953
Q95 1S953
Q96 1S953
Q90 2SC2718
Q97 μPC451C
Q101 2SC2718
+0.92 Vdc
SWEEPSIG
DC AMPLIFIER (AFC LOOP)



Component list: Table 6-17

Fig. 5-41 CIRCUIT DIAGRAM OF Z5 IF MIX AND RETURN LOSS (RECEIVER) (42W11108)

5.3.8 Z6 MARKER AND SPECTRUM

(1) Circuit description

Z5 Local oscillator output signal (J2) is mixed with the crystal OSC signal by the mixer (Z1) and converted into 0 to 50 MHz signal.

CENTER MARKER is obtained by limiting the bandwidth of the amplifier (Q34) output signal using the LPF (L7) and amplifying it by Q36.

Its signal is mixed with the 2 MHz COMB marker and slide marker signal and sent to Z13 CRT.

2 MHz COMB MARKER is obtained by mixing the 2 MHz signal of J3 with the output signal of the amplifier (Q34) by the harmonic mixer (Q26). Its signal is amplified (Q27), its bandwidth is limited by the LPF (L21), and then mixed with the center marker through the amplifier (Q29).

SLIDE MARKER signal is obtained by mixing (Z2) the output signal of VCO (Q13, Q14) and the crystal OSC signal.

Band	VCO frequency	Mixer output
70 MHz	87.78 ∿ 62.78 MHz	0 ∿ 25 MHz
140 MHz	122.22 ∿ 72.22 MHz	0 ∿ 50 MHz

The output signal is amplified (Q39) and sent to the mixer (Z3).

SLIDE MARKER is obtained by limiting the bandwidth of the mixer (Z3) output signal using the LPF (L23) and mixing with the 2 MHz COMB MARKER by the amplifier (Q29).

MARKER CHECK converts the sweep signal demodulated by Z5 to the square wave with Q44, turns on Q33 and Q38 for only half cycle when

MARKER CHECK is ON (J1-9: 0 V), and erases the marker. This marker erase timing corresponds to the right half of the CRT.

SLIDE MARKER counting signal is obtained by dividing (Q41 through Q43) the SLIDE MARKER signal (output of Q39) into 1/40 and is sent to Z11 via J4.

Counter gate signal is obtained by dividing (Q83 through Q89) the 2 MHz CLOCK into $1/16 \times 10^4$ and is sent to Z11 via J1-13.

SPECTRUM is obtained by mixing the 17.78 MHz crystal oscillator (Q54, Q55) signal with the 17.78 MHz IF signal swept by approximately ±700 kHz using the mixer (Q59).

The bandwidth of the mixer output signal is limited by the LPF (L31, L32 and L33), amplified by Q61 and Q62, and sent to Z13 CRT.

J1-20 (20) will become +5 V when the spectrum is ON.

(2) Repair

1. Slide Marker does not function

Apply the 80 MHz, 0 dBm signal to IF INPUT.
Set IF BAND to 70 MHz and MARKER to SLIDE.

case 1 → 87.78 MHz CRYSTAL OSCILLATOR is abnormal

Check the frequency and level of ❶.

case 2 → VCO is abnormal

Check that the voltage of R148 varies in negative potential when the MARKER FREQUENCY knob on the front panel varies.

Check that oscillation frequency at ❷ is in 87.78 to 137.78 MHz or more when the MARKER FREQUENCY knob on the front panel varies.

case 3 → MIXER is abnormal

Set the frequency of ❷ to 97.78 MHz.

Check the frequencies of ❸ and ❺.

Check the frequency and level of ❹.

2. Spectrum cannot be measured

Apply the 70 MHz, 0 dBm signal to IF INPUT.
Set IF BAND to 70 MHz.

case 1 → 17.78 MHz CRYSTAL OSCILLATOR is abnormal.

Check the frequency and level of ❼.

case 2 → AFC circuit does not operate

Check the operation of Z4 and Z5.

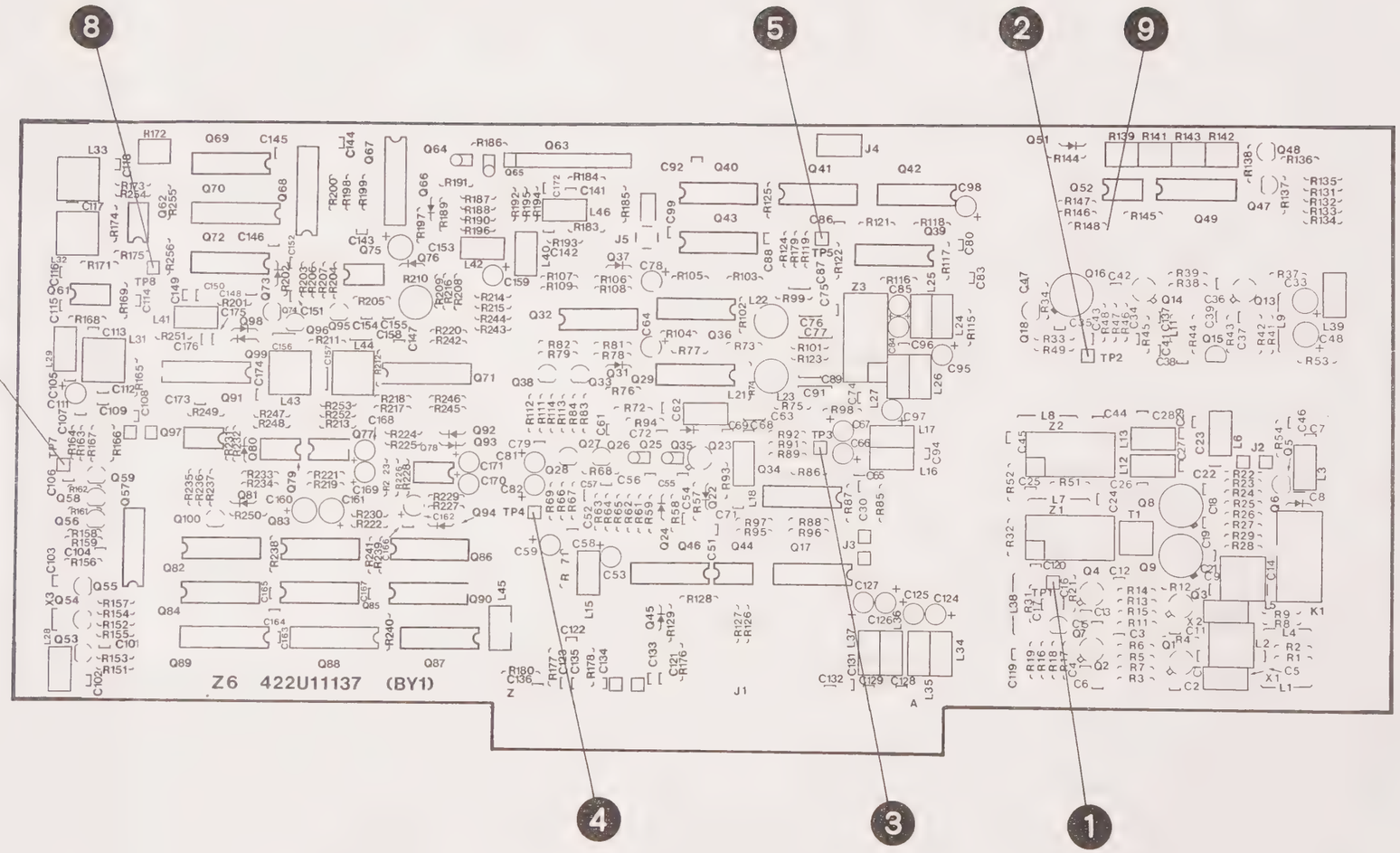


Fig. 5-42 Component Location of Z6

FROM Z5 (IF SIGNAL)
FROM Z5 LOCAL SIGNAL)
FROM Z7 (2MHz CLOCK)
J5
J2 270DP-P-1.5
J3
PIO11-02F

CRYSTAL OSCILLATOR
ME453KLM
⊖ is connected to ⊕
X1 8.778MHz
X2 122.22MHz
Q1 Q2 2SC124
Q3 Q4
Q5 2SC2718
Q6 1S953
K1
ME538KLM ONLY
ME583KLM ONLY

LIMITTER
Q8 Q9 2SC1252
T1
MIXER
Z1 R&K M1
L.P.F
Q7 2SC2901
Q10 μPC251C (2/2)
Q11 μPC251C (1/2)
Q22 1S953
Q17 74LS00
Q46 74LS00
Q23 2SA711
Q24 1S953
AMP
Q34 UA733CN
Q39 UA733CN
SLIDE MARKER
SLIDE MARKER OFF SET
Q51 RD9.1EB

VCO (SLIDE HAER)
Q13 Q14 2S1254
Q15 FE53H
Q16 2SC1252
Q12 2SC2718
Z2 R&K M1
70MHz Band 0~25MHz
140MHz Band 0~50MHz

Q47 Q48 2SC2718
Q49 TC4066BP
Q52 μPC251C
Q61 μPC157C
Q62 μPC151C
Q72 HD74121
Q73 RD3.9EB
Q74 2SA1151

IF BAND	
70MHz	140MHz
0V	+5V

	70MHz BAND	140MHz BAND
MIN	R143	R142
MAX	R141	R139

9 VCO BIAS

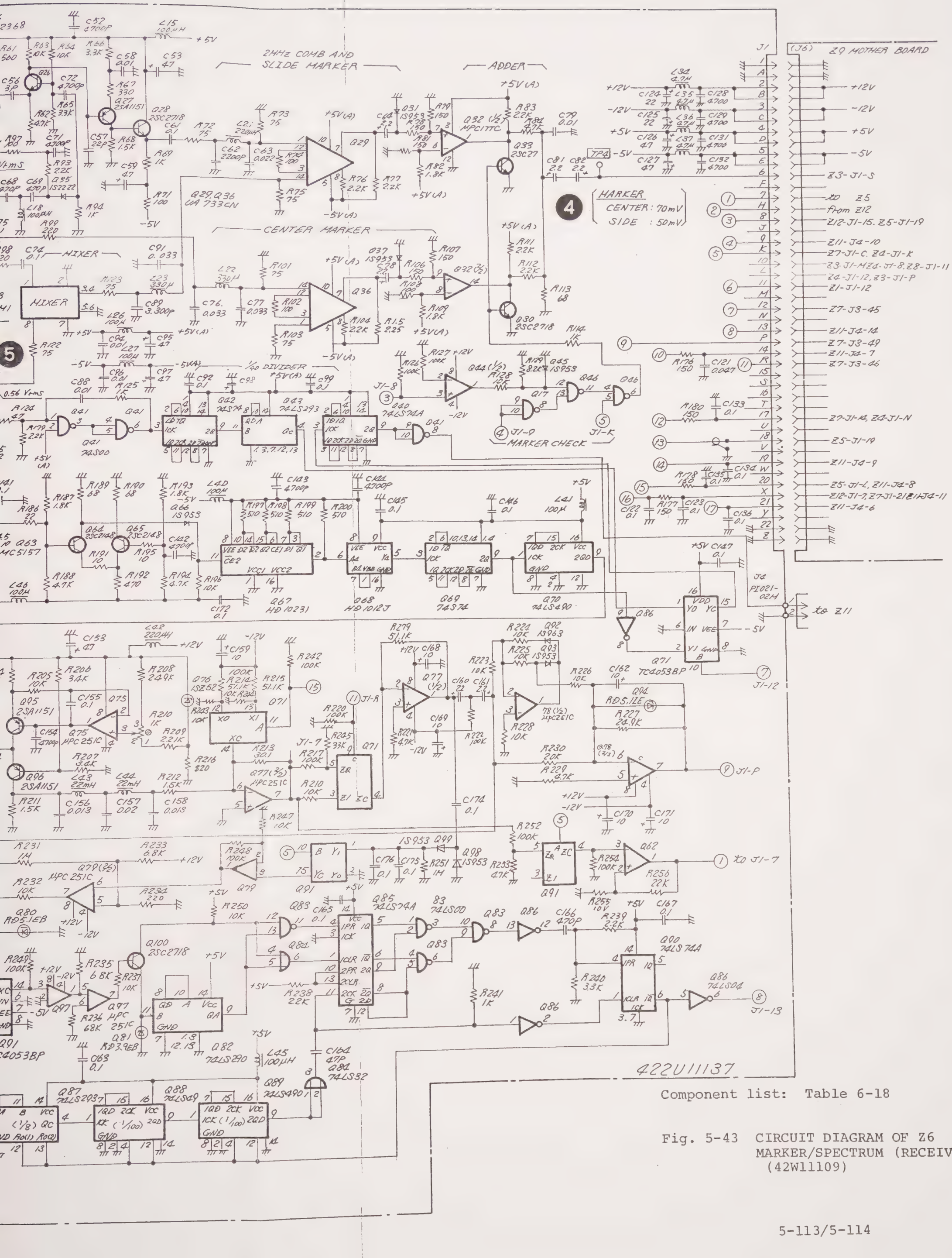
	0MHz	25MHz
70MHz	-2.46V	-0.32V
140MHz	0MHz	50MHz
	-4.2V	-1.11V

17.78MHz CRYSTAL OSCILLATOR
X3 17.78MHz
MIXER
SPECTRUM DETECTOR
SPECTRUM GAIN ADJ
0.83 Vrms
IF Signal 0.3 Vrms [17.18 10.7MHz]
Spectrum ON/OFF
ME453KLM
(1) Ⓐ is connected to Ⓒ
(2) Ⓑ is connected to Ⓐ

+5V and Earth pin of IC

Q NO	NAME	+5V	EARTH
Q17 Q46 Q57 Q83	74LS00	14	7
Q86	74LS04	14	7
Q84	74LS32	14	7

8 H: 2m sec/DIV
V: 0.5 V/DIV



Component list: Table 6-18

Fig. 5-43 CIRCUIT DIAGRAM OF Z6 MARKER/SPECTRUM (RECEIVER) (42W11109)

Table 5-5 Output data (Cont'd)

Item	Address	Data Bus	Contents of data	Remarks
(8) Noise Suppress	9E7*H	D0 D1	Noise Suppress Noise Suppress	\ | Normal 0 | AVG(STO) 1 | Y-STO 2 | AVG-STO 3 D0 | L | H | L | H D1 | L | L | H | H
(9) Recorder Control	9E8*H	D0 D1 D2	Recorder Recorder Recorder	Y1; ON; H, OFF; L Y2; ON; H, OFF; L M ; ON; H, OFF; L
(10) A/D CONV. Input Select	9E9*H	D0 D1 D2 D7	A/D Input Select A/D Input Select A/D Input Select A/D Run/Hold	\ | \ | IF level | BB level | \ | Y1 Range | Y2 Range | Y1 P-P | Y2 P-P \ | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 D0 | L | H | L | H | L | H | L | H D1 | L | L | H | H | L | L | H | H D2 | L | L | L | H | H | H | H | H H: Run L: Hold
(11) Detector Reset	9EA*H	D0 D1 D2 D3	Y1R-Reset Y2R-Reset Y1P-P-Reset Y2P-P-Reset	H: Reset L: Set H: Reset L: Set H: Reset L: Set H: Reset L: Set
(12) Hor Select/ Y1, Y2 ON-OFF	9EB*H	D0 D1 D4 D5 D7	Spectrum BB SWEEP Y1 ON/$\overline{\text{OFF}}$ Y2 ON/$\overline{\text{OFF}}$ CAL ON/$\overline{\text{OFF}}$	SPECTRUM on: H BB SWEEP on: H Y1 ON: H Y2 ON: H CAL ON: H
(13) Frequency Select	9EC0H	D0 ∫ D7	Counter Marker	Counter : 00H Marker : 01H
(14) Sweep Width Range	9EC1H	D0 ∫ D7	Range	Range(X1) : 00H Range(X10) : 01H
(15) Plot key Display	9EC2H	D0 ∫ D7	LED ON/OFF	LED ON : 00H LED OFF : 01H
(16) Power Meter (IF)	9EC5H	D0 ∫ D7	Set/Reset	Reset : 00H Set : 01H
(17) Power Meter (BB)	9EC6H	D0 ∫ D7	Set/Reset	Reset : 00H Set : 01H
(18) Power Meter (Reference)	9EC7H	D0 ∫ D7	Set/Reset	Reset : 00H Set : 01H

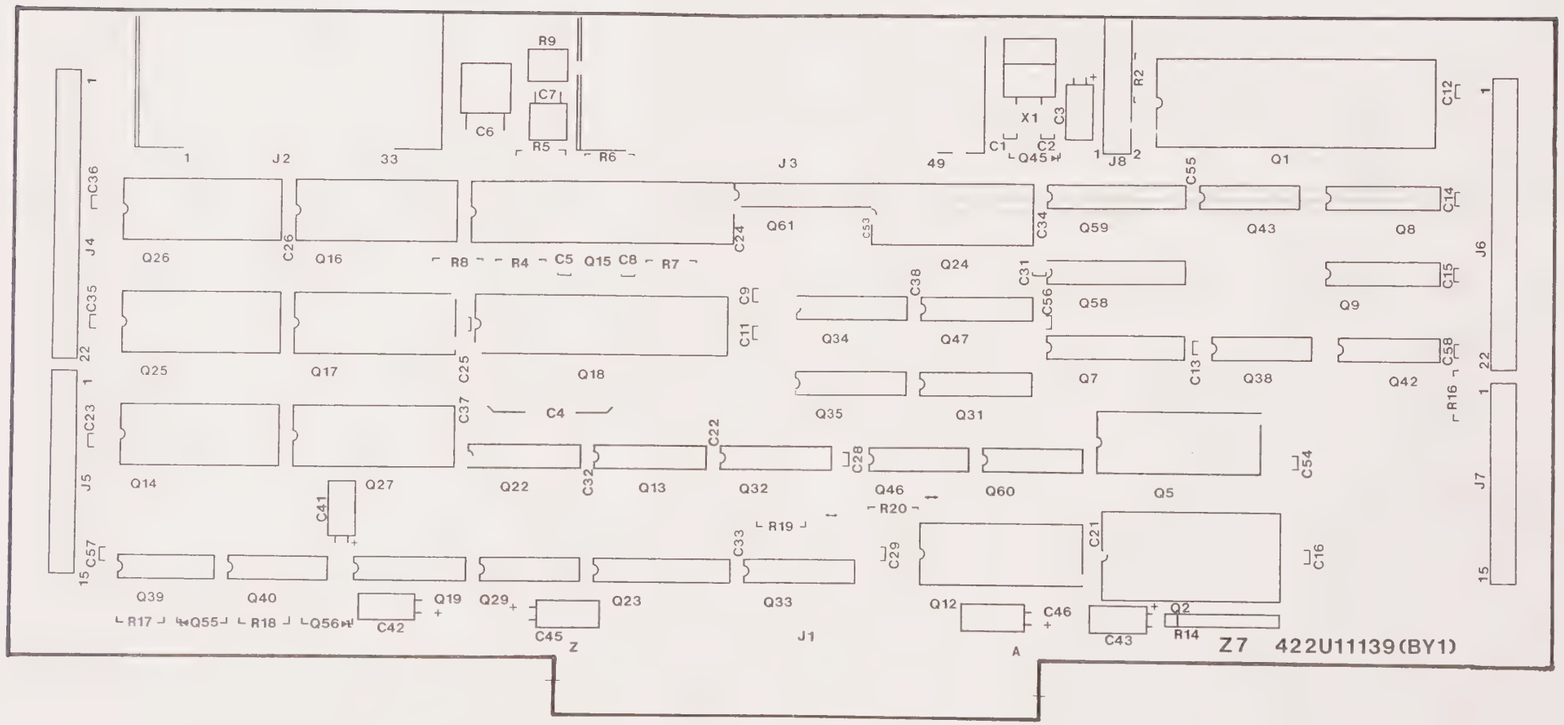


Fig. 5-44 Component Location of Z7

To Z8 GP-IB

(J2)

To Z19 CHARACTER BOARD

(J1)

J6 U-PA2221

J5 U-PA1521

J4 U-PA2221

J3 MPI3-50P-254DS

Q1 μPD8085AC

X1 15P C1 22P C2

Q2 EP ROM 16Kx8 -25N

Q7 74LS373

Q5 HM6116P

Q15 μPD8279C-5

Q16 TC4508BP

Q38 74LS04

Q43 74LS32

Q8 Q9 74LS367

Q42 TC40H030P

Q12 74154

Q46 Q60 TC40H008P

Q13 TC40H138P

Q39 Q40 TC40H004P

Q14 74154

Q58 Q59 74LS244

R16 15K R17 R18 470 R14 IHR-B-223JA

Q45 1S953

Q55 Q56 RD7.5EB

TO Z6-J31

J8 P1021-2M

J7 U-PA1521

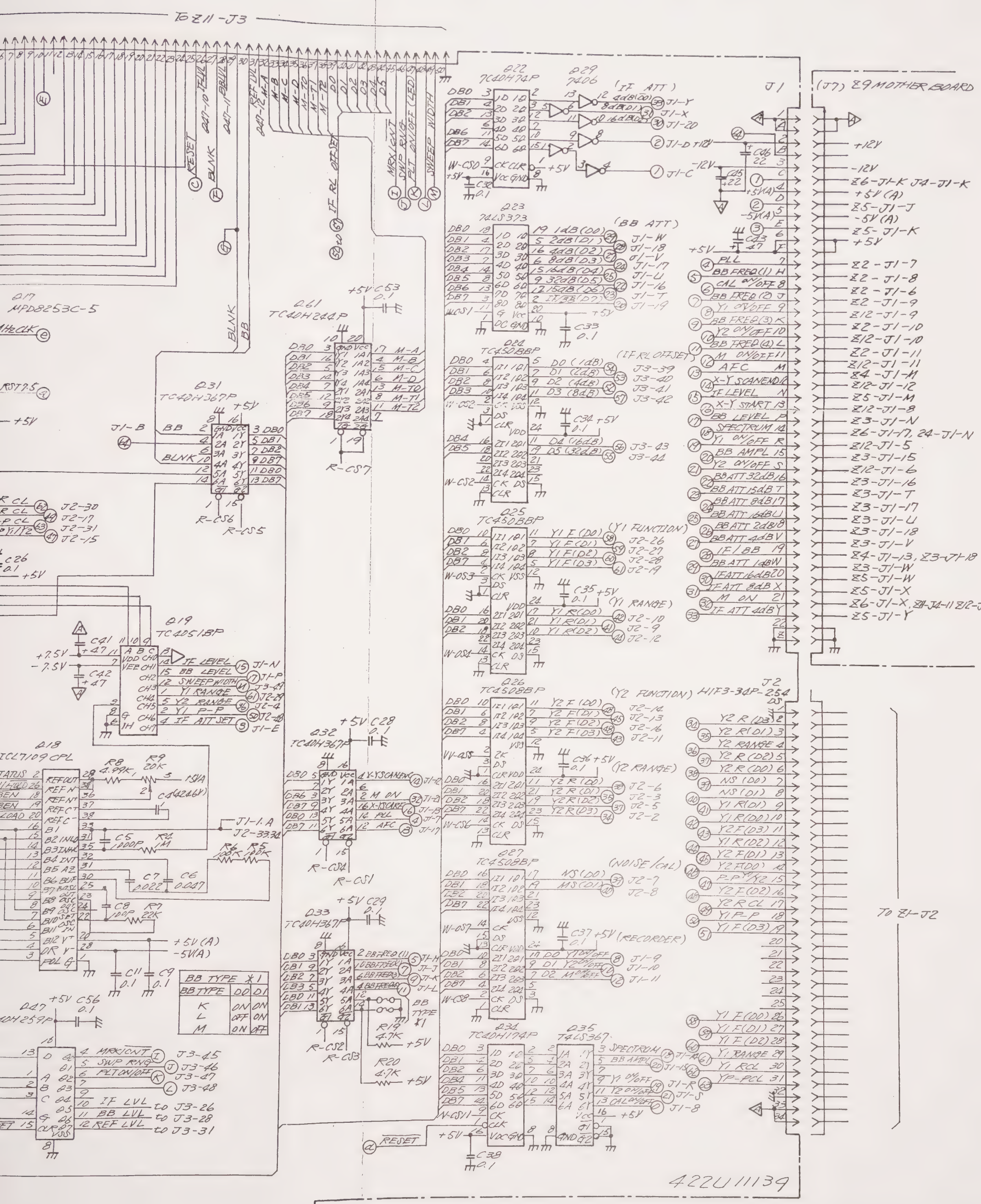
To Z8 GP-IB

NOTE : TTL IC

	Name	+5V	GND(m)
Q38	74LS04	14	7
Q43	74LS32	14	7
Q29	7406	14	7

CMOS IC

	Name	+5V	GND(m)
Q39, Q40	TC40H004P	14	7
Q42	TC40H032P	14	7
Q46 Q60	TC40H008P	14	7



Component list: Table 6-19

Fig. 5-45 CIRCUIT DIAGRAM OF Z7 CPU BOARD (RECEIVER) (42W11110)

5.3.10 Z9 MOTHER BOARD

(1) Circuit Description

This is the wiring circuit that connects the various PC boards.

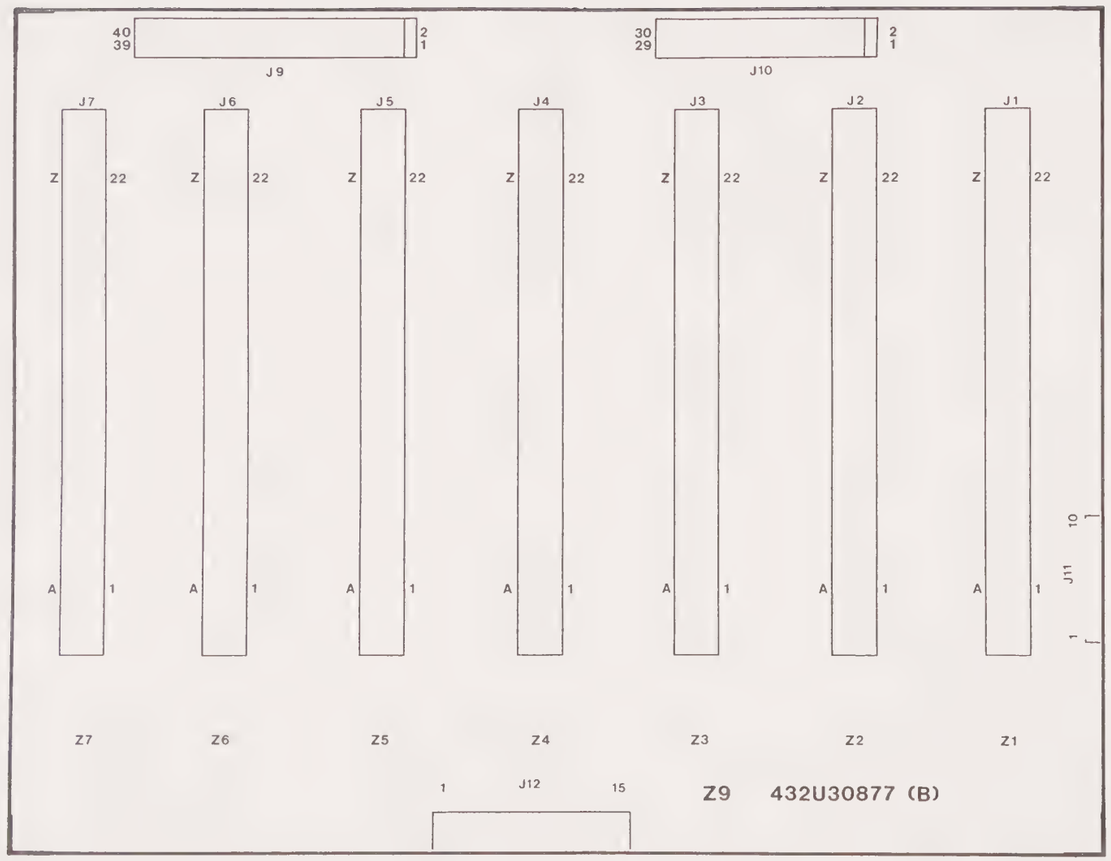
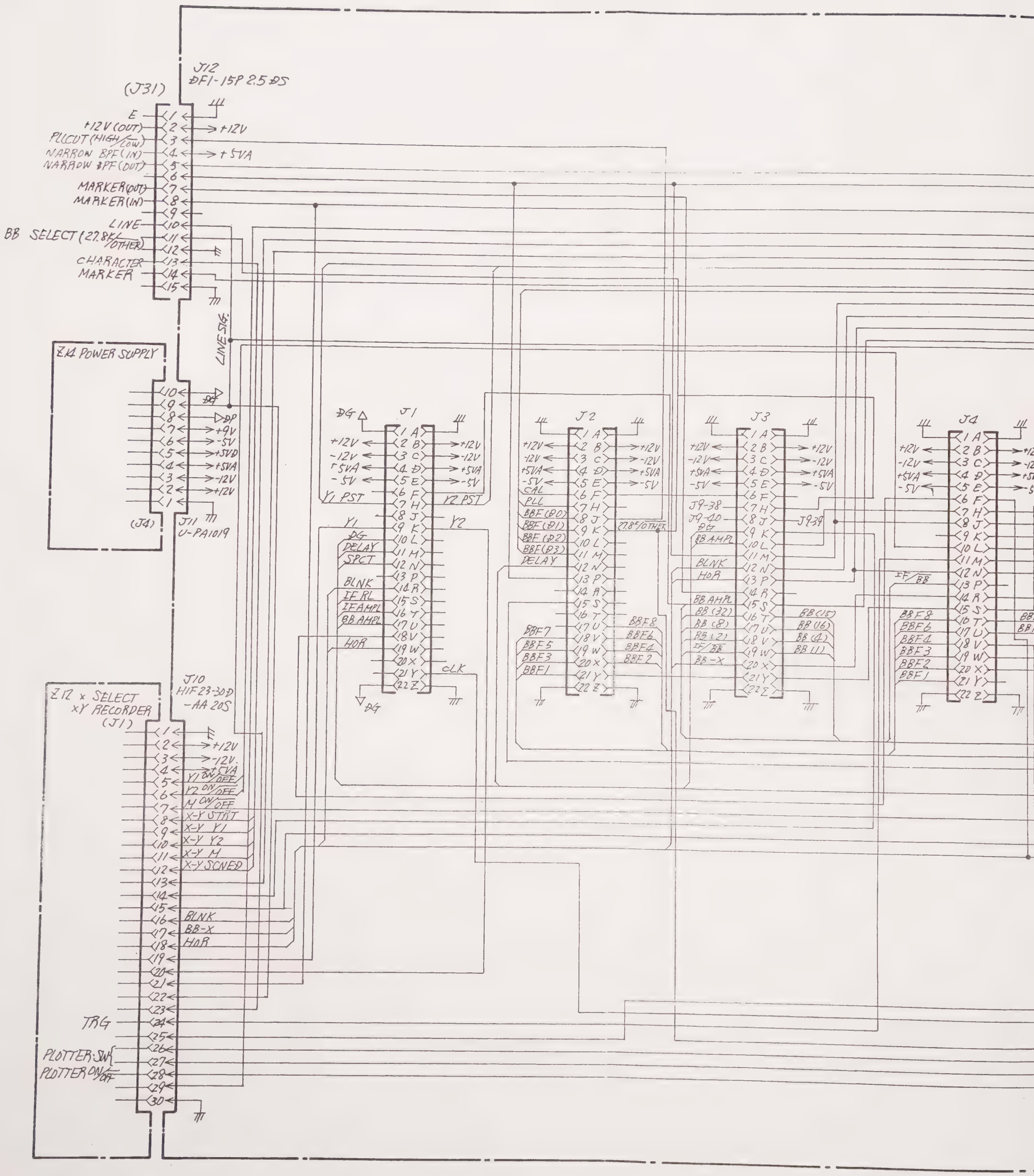
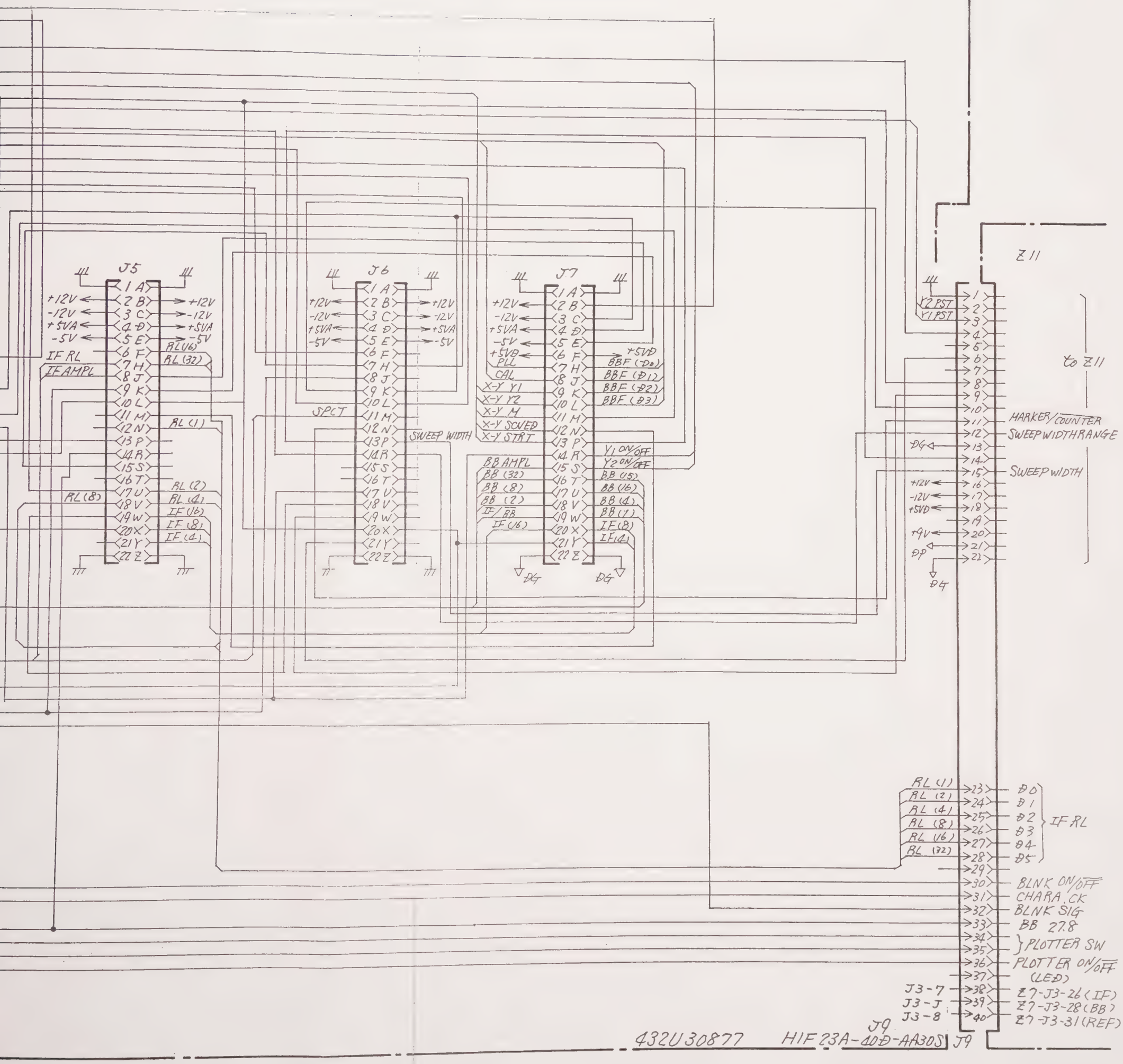


Fig. 5-46 Component Location of Z9


J12
DF1-15P 2.5DS
(J31)
E
+12V (OUT)
PLLCUT (HIGH/LOW)
NARROW BPF (IN)
NARROW BPF (OUT)
MARKER (OUT)
MARKER (IN)
LINE
BB SELECT (27.8K/OTHER)
CHARACTER MARKER
LINE SIG.
Z14 POWER SUPPLY
(J4)
J11
U-PA1019
J10
HIF23-30D
-AA 20S
Z12 x SELECT
XY RECORDER
(J1)
Y1 ON/OFF
Y2 ON/OFF
M ON/OFF
X-Y START
X-Y Y1
X-Y Y2
X-Y M
X-Y SCNED
BLNK
BB-X
HOR
TRG
PLOTTER SW
PLOTTER ON/OFF
J1
Y1 PST
Y2 PST
Y1
Y2
DELAY
SPCT
BLNK
IF RL
IF AMPL
BB AMPL
HOR
CLK
J2
CAL
PLL
BBF (D0)
BBF (D1)
BBF (D2)
BBF (D3)
DELAY
27.8K/OTHER
BBF8
BBF7
BBF6
BBF5
BBF4
BBF3
BBF2
BBF1
J3
J9-38
J9-40
BB AMPL
BLNK
HOR
BB (32)
BB (8)
BB (2)
BB-X
BB (16)
BB (4)
BB (1)
J4
IF/BB



Component list: Table 6-20

Fig. 5-47 CIRCUIT DIAGRAM OF Z9 MOTHER BOARD (RECEIVER) (42W11112)

5.3.11 Z10 OPERATING/LED BOARD

(1) Circuit description

This circuit consists of the operating circuit and LED display circuit.

Function settings are read by the keyboard interface (LSI) on Z7 CPU when the pushbutton switch (S1 to S21) is turned ON/OFF and are sent to the CPU.

IF BAND switching is accomplished by selecting 70 MHz: 0 V or 140 MHz: +5 V using the slide switch (S23).

This switching signal is used to switch the IF local oscillator and Z6 crystal oscillator.

Slide marker frequency is set by the variable resistor (R4).

Marker position is set by adding the voltage that is set by the variable resistor (R1) to the offset voltage of the marker base line.

Y1, Y2 position is set by adding the voltage that is set by the variable resistor (R5, R6) to each of Y1 and Y2 RANGE circuits of Z1.

LED DISPLAY: IF LEVEL (Q7 through Q10), BB LEVEL/FM DEVIATION (Q11 through Q14), Y1 RANGE/Y1 P-P (Q1 through Q3), and Y2 RANGE/Y2 P-P (Q4 through Q6) are displayed by time-sharing method. There are driven by the common data line (B00 through B06), the decimal point line (J1-53), and scan line (S00 through S14) sent from Z11.

SLIDE MARKER is displayed (Q15 through Q18) by time-sharing method for the value counted by the Z11 counter using the data line (ⓗ - ⓟ) and scan line (ⓡ - ⓤ).

FUNCTION switch LED is turned on by the data line (A01 through A06) and scan line (S00 through S14) sent from Z11.

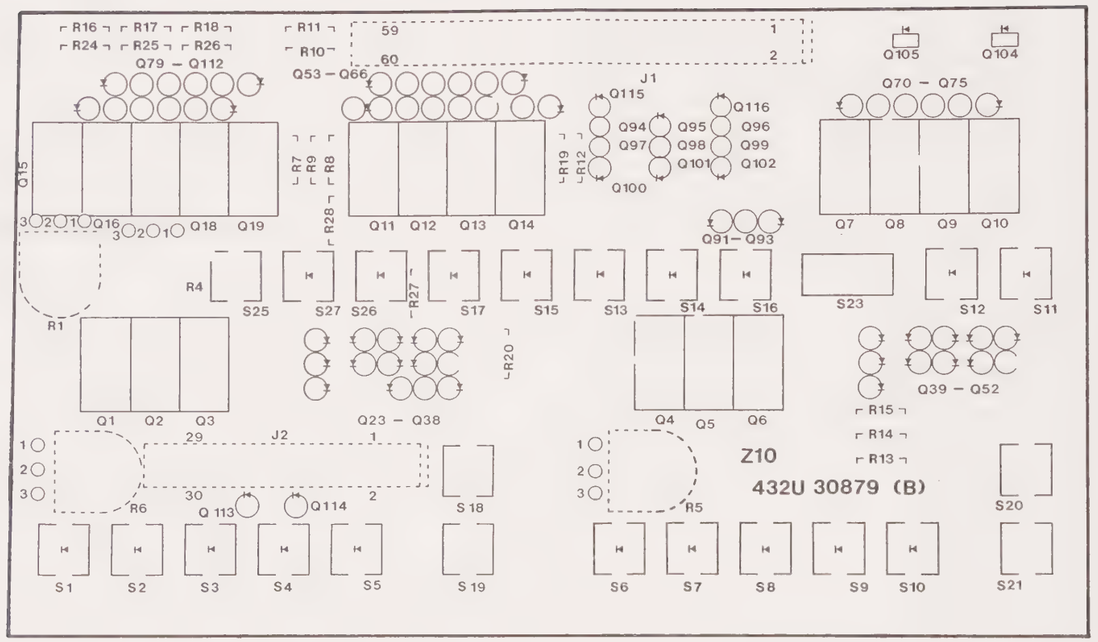


Fig. 5-48 Component Location of Z10

Y1
LINEARITY/DG
DELAY/DP
AMPL
RETLOSS
AM-PM

Y2
LINEARITY/DG
DELAY/DP
AMPL
ΔC
SPECTRUM

RECEIVER MODE
IF
BB

RANGE
AUTO
MANUAL

P-P

NORMLZR

S1~S
HL20-

J1

1	RL1
2	RL2
3	RL3
4	RL4
5	RL5
6	SL00
7	SL01
8	SL02
9	SL03
10	SL04
11	SL05
12	SL06
13	SL07
14	A81
15	A82
16	A83
17	A85
18	A86
19	A91
20	A92
21	A93
22	A101
23	A102
24	A103
25	A104
26	A106
27	A111
28	A112
29	A121
30	A122
31	A151
32	A01
33	A02
34	A03
35	A04
36	A05
37	A06
38	SC00
39	SC01
40	SC02
41	SC03
42	SC04
43	SC05
44	SC06
45	SC07
46	SC08
47	SC09
48	SC10
49	SC11
50	SC12
51	SC13
52	SC14
53	B07
54	B00
55	B01
56	B02
57	B03
58	B04
59	B05
60	B06

to Z10-J1

SL00 S1 RL1 A01 S2 RL2 A02 S3 RL3 A03 S4 RL4 A04 S5 RL5 A05

SL01 S6 RL1 A01 S7 RL2 A02 S8 RL3 A03 S9 RL4 A04 S10 RL5

SL02 S11 RL1 A01 S12 RL2 A02

SL03 S13 RL1 A01 S14 RL2 A02

SL04 S15 RL1 A01

SL05 S16 RL1 A01

A01~A06
SC00~SC14
SC00 SC01 SC02 SC03 SC04

(Y1 RANGE/Y1 P-P)

(Y2 RANGE/Y2

SC02 Q1 SC01 Q2 SC00 Q3 SC05 Q4 SC04
3 14 CA CA a b c d e f g dp 1 13 10 8 7 2 11 9

B07
B00
B01
B02
B03
B04
B05
B06

(IF LEVEL dBm)

SC06 Q7 SC09 Q8 SC08 Q9 SC07 Q10 SC10

(Y1 DEMENSION(1))
1. %
2. ns
3. dB
5. °/dB
6. DEG

(Y1 DEMENSION(2))
1. /div
2. P-P
3. /dB/div

(Y2 DEMENSION(1))
1. %
2. ns
3. dB
4. mV
6. DEG

(Y2 DEMENSION(2))
1. /div
2. P-P

CAL

FM DEVIATION KHz PmS

BB LEVEL dBm

IF LEVE

+6V(D)

A81 Q23
A82 Q25
A83 Q27
A85 Q29 Q30
A86 Q31 Q32
Q29~Q32 LN38GP
Q23, Q25, Q27 LN38GP

A92 Q33 Q34
A91 Q35 Q36
A93 Q37 Q38
Q28 R20 100
Q28, Q33~Q38 LN38GP

A101 Q39
A102 Q41
A103 Q43
A104 Q45 Q46
A106 Q47 Q48
Q39, Q41, Q43 LN38GP

A112 Q49 Q50
A111 Q51 Q52
Q45~Q66 LN38GP

A151 Q53 Q54

A121 Q55 Q56 R8 33
Q57 Q58 R9 33
Q59 Q60 R19 33
A122 Q61 Q62 R10 33
Q63 Q64 R11 33
Q65 Q66 R12 33

Q70 Q71
Q72 Q73
Q74 Q75
Q70~Q7
LN38GP

S25
HL20-

MARKER

MARKER FREQUENCY

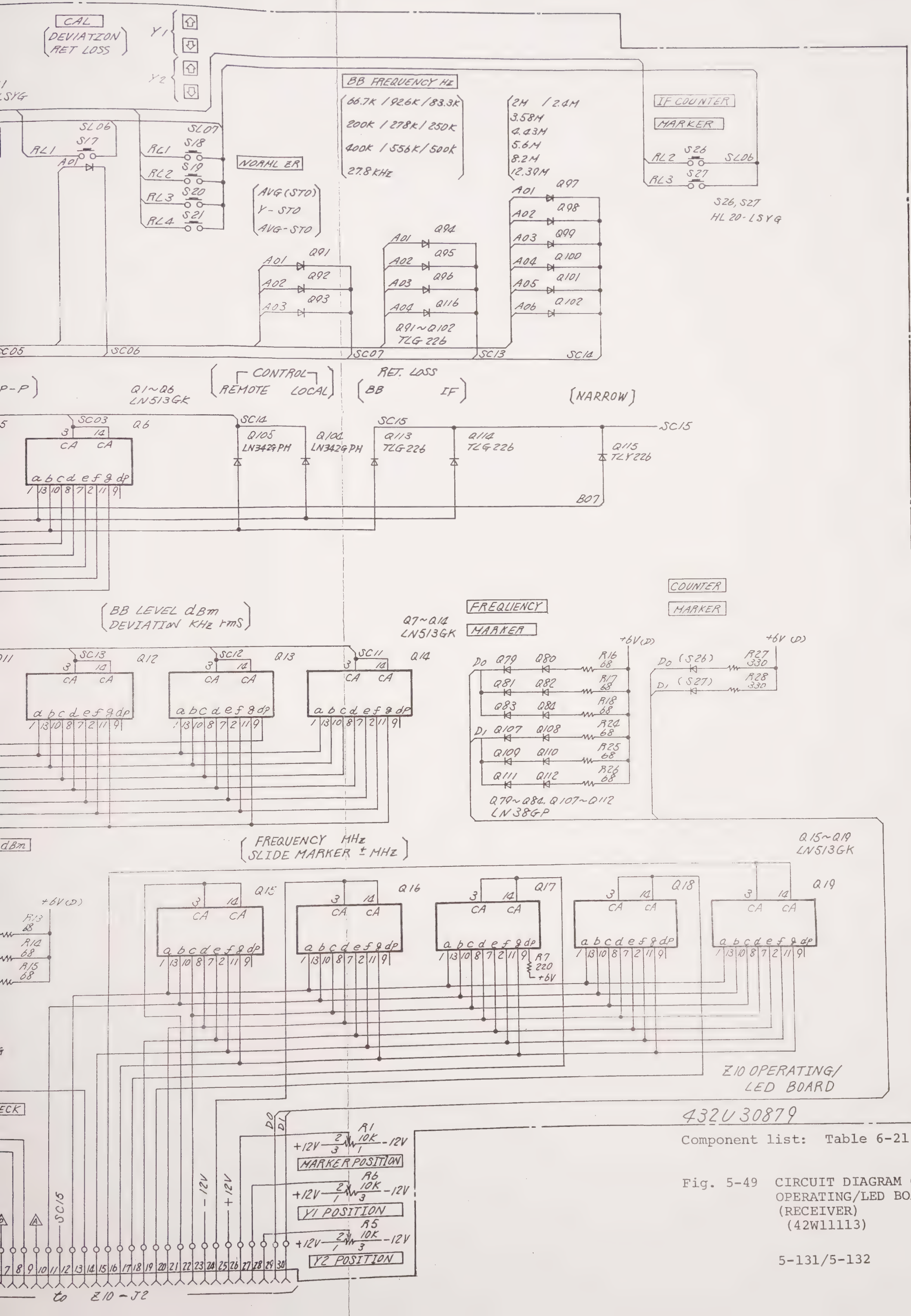
R4 50K 20HP-5S

+5V(D)
S23
SL7-4(PH)8H6-2-2

IF BAND MHz
(70 140)

+5V(D)
+15V(D)

J2



432U30879

Component list: Table 6-21

Fig. 5-49 CIRCUIT DIAGRAM OF Z10 OPERATING/LED BOARD (RECEIVER) (42W11113)

5.3.12 Z11 LED DRIVER

(1) Circuit description

This circuit consists of the circuit for driving the LED display data from the Z7 CPU, the circuit for reading the information of Z10 pushbutton switch and sending them to the programable keyboard/display interface (LSI) of Z7 CPU, and the slide marker counter.

Data line (OUT A0 - A2) are the data lines which are used to light LEDs of the function keys (Z10, S1 through S21) and which are decoded by the decoder (Q2) and sent to Z10.

Data line (OUT A3) is used to light the decimal point of the LED display, which is sent to Z10 via the driver (Q13).

Data lines (OUT B0 through B3) are used to send data to the LED display (Z10-Q1 through Q14). The data are converted by the BCD-SEVEN SEGMENT converter (Q15) and sent to Z10 via the driver (Q16).

SCAN line 1 (SL0 through SL3) is a digit signal for lighting the LED time-sharing method, which is decoded by the decoder (Q8) and sent to Z10 via the driver (Q9 through Q12).

SCAN LINE 2 (SL0 - SL2) is a digit signal for reading the ON/OFF data of the function keys (Z10, S1 through S21), which is decoded into the SCAN LINE (SL00 through SL07) by the decoder (Q1) and sent to Z10.

Return line (RL1 through RL5) is the return line for reading the ON/OFF data of the function keys (Z10, S1 through S21) and sent to Z7 CPU.

SLIDE MARKER: The frequencies of the SLIDE

MARKER are counted by the frequency counter (Q28). Its data are converted by the BCD-SEVEN SEGMENT converter (Q29) and sent to Z10 via the driver (Q30). At the same time the digit signal (Q28, T2 through T5) is also sent to Z10 via the driver (Q32).

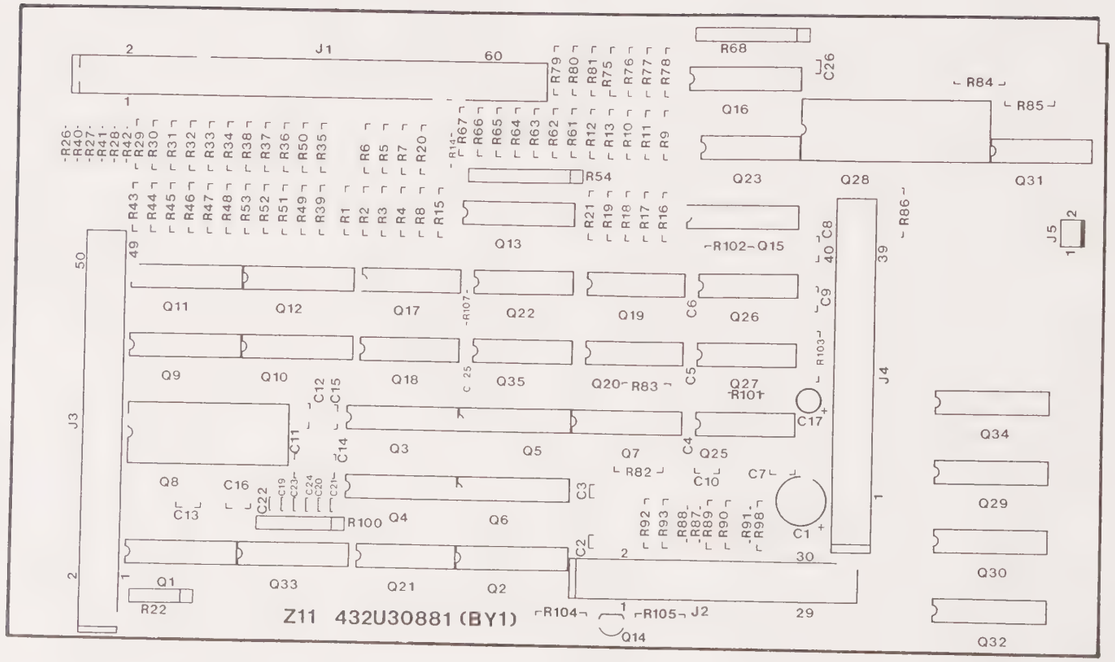


Fig. 5-50 Component Location of Z11

J3
HIF3-50P-2.54DSA

(J34)

to Z7-J3

RL1 RL2 RL3 RL4 RL5 RL7 ① J4-34 ③ J4-31

SL0 SL1 SL2 SL3

OUTA0 OUTA1 OUTA2 OUTA3 OUTB0 OUTB1 OUTB2 OUTB3

BD RESET

② J4-30 ④ J4-32 ⑤ J4-33 ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ J4-15

M-A M-B M-C M-D M-TD M-T1 M-T2

D0 D1 D2 D3 D4 D5

IF RET LOSS

⑫ J4-36 ⑬ J4-11 ⑭ J4-12 ⑮ J4-35 ⑯ J4-37 ⑰ J4-38 ⑱ J4-39 ⑧ J3-45 ⑨ J3-46 ⑪ J3-49 +12V -12V +6V(D)

IF RET LOSS

J5
PI011-02H

(J4)

From Z6

J4
HIF3-40P-254DSA

(J27)

⑫ J2-28 ⑬ J2-27 ⑭ ⑮ ⑯ ⑰ ⑱ ⑧ J3-45 ⑨ J3-46 ⑪ J3-49 +12V -12V +6V(D)

From Z9-J9

+C1 470 C17 47 C2 0.1 C3 0.1 C4 0.1 C5 0.1 C6 0.1

D0 D1 D2 D3 D4 D5 IF RET LOSS ⑦ J3-39~44

② J3-27 ③ J3-10 ④ J3-29 ⑤ J3-30 ① J3-9 ⑲ ⑩ J3-47 ㉛ J3-26 ㉜ J3-28 ㉝ J3-31

+5V(D) Q1 74LS156

SL0 SL1 SL2 → 1G 2G A B 1C 2C

1Y0 1Y1 1Y2 1Y3 2Y0 2Y1 2Y2 2Y3 → SL00 SL01 SL02 SL03 SL04 SL05 SL06 SL07

⑲ J4-35

+5V(D) Q2 74LS138

SL0 SL1 SL2 → A B C

+5V → G1 G2A G2B

Y0 Y1 Y2 Y3 Y4 Y5 Y6 Y7 → AA01 AA02 AA03 AA04 AA05 AA06

+5V(D) Q3 74LS174

AA01 AA02 AA03 AA05 AA06 → 1D 2D 3D 4D 5D 6D CK

1Q 2Q 3Q 4Q 5Q 6Q CR → +5V(D)

Q21 74LS04

⑳

Q17 7407

A81 A82 A83 A85 A86

R1~R3 220Ω R4,R5 82Ω

+5V(D) Q4 74LS174

AA01 AA02 AA03 → 1D 2D 3D

1Q 2Q 3Q → Q18

Q18 7407

A92 A91 A93

R6~R8 82Ω R20 82Ω

Q21 → CK

+5V(D)

㉑

+5V(D)

R22 R22 100×4

SL0 SL1 SL2 SL3

R22 R22

+5V(D) → 1H

+5V(D) → ST

Q8 TC4514BP

S0 S1 S2 S3 S4 S5 S6 S7 S8 S9 S10 S11 S12 S13 S14 S15 → L00 L01 L02 L03 L04 L05 L06 L07 L08 L09 L10 L11 L12 L13 L14 L15

Vss Vdd

+5V(D)

Q9 TD62004P

L00 L01 L02 L03 L04 L05 L06 → I1 I2 I3 I4 I5 I6 I7

O1 O2 O3 O4 O5 O6 O7 → R26 R27 R28 R29 R30 R31 R32 4.7 SC00 4.7 SC01 4.7 SC02 4.7 SC03 4.7 SC04 4.7 SC05 4.7 SC06

Q10 TD62004P

L07 L08 L09 L10 L11 L12 L13 → I1 I2 I3 I5 I6 I7 I4

O1 O2 O3 O5 O6 O7 O4 → R33 R34 R35 R36 R37 R38 R39 4.7 SC07 4.7 SC08 4.7 SC09 4.7 SC11 4.7 SC12 4.7 SC13 4.7 SC14

+5V(D) Q15 74LS247

OUTB0 OUTB1 OUTB2 OUTB3 → A B C D

RBI BI LT → +5V(D)

a b c d e f g → Q23 ×7 (7406)

Q21 Q9

R68 2.2K×7

B1 B2 B3 B4 B5 B6 B7 → CO

Q27 74LS00

R102 1K C25 0.1 R107 4.7K C8 0.01

Q35 74LS74A

Q26 74LS04 Q27

R101 1K C7 4700P C9 1000P R103 1K C10 1000P

R82 22K R83 3.3K

Q25 74LS74A

R84 4.7K R85 4.7K R86 1M

Q28 TC5032P

TRF OP Vdd D C B A → M-D M-C M-B M-A

CA4 IN1 IN2 VSS TR MR BC REXT SIN

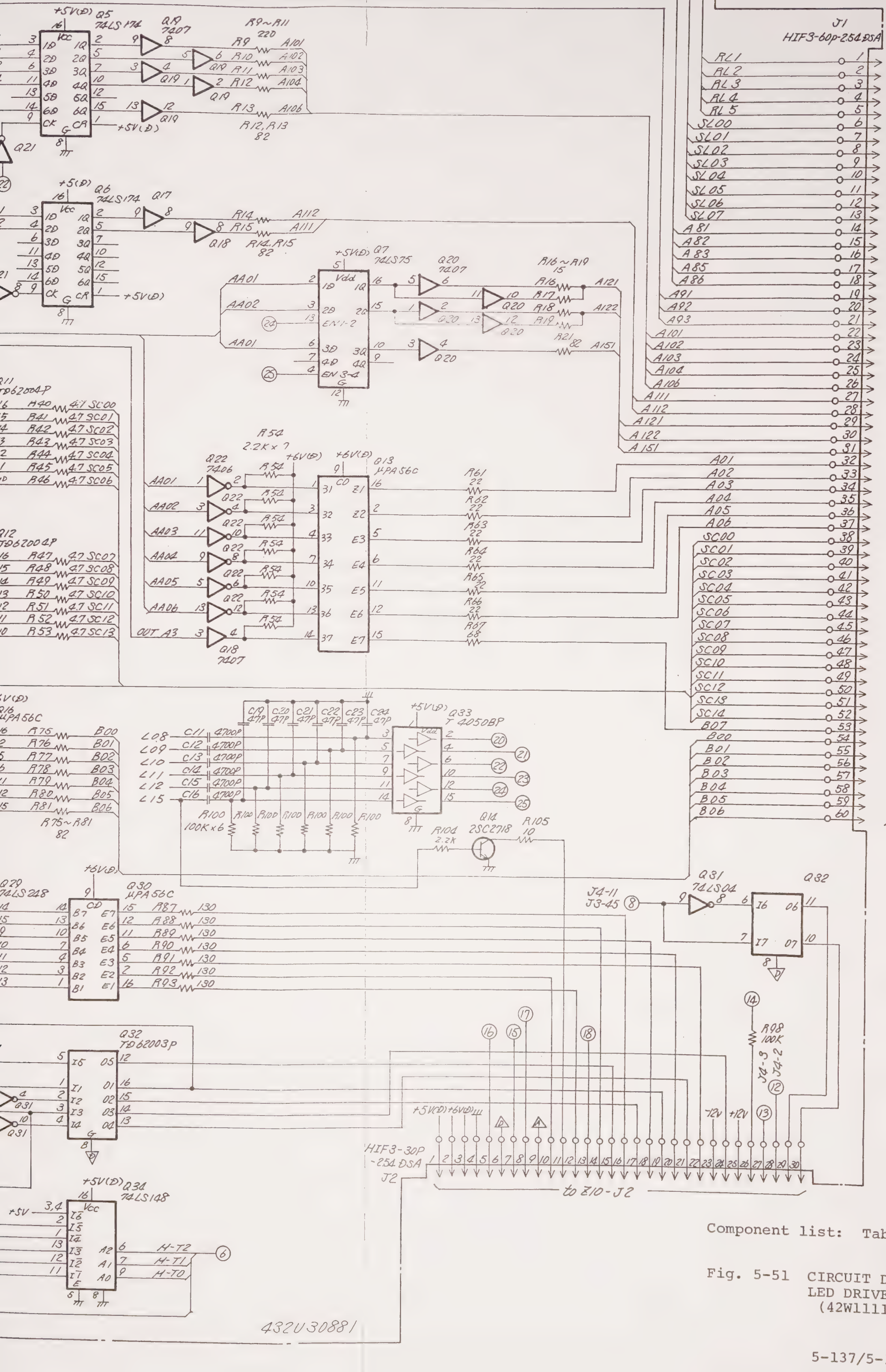
T5 T4 T3 T2 T1

C26 0.1

Q31 74LS04

T1 T2 T3 T4 T5

	Vcc	GND	Q NAMBER
74LS00	14	7	Q27
74LS04	14	7	Q21.Q31.Q26
7406	14	7	Q22.Q23
7407	14	7	Q17~Q20



Component list: Table 6-22

Fig. 5-51 CIRCUIT DIAGRAM OF Z11 LED DRIVER (RECEIVER) (42W11114)

5.3.13 Z12 X SELECT/X-Y RECORDER

(1) Circuit description

This circuit consists of a circuit for controlling the Y signal to be sent to the CRT, a circuit for adjusting the phase of X signal, and the X-Y recorder circuit.

Y signal of CRT: Y1 signal (J1 - 20), Y2 signal (J1 - 19), and marker signal (J1 - 21) are selected on the time sharing basis and are sent to Z13 CRT.

There are two time sharing modes of Y signal, chopping mode and alternate mode.

When the chopping mode is used, the 60 kHz signal of the chopping oscillator (Q6) is divided by the 1/3 divider (Q5) and the divided signals are used to control the selector (Q15).

When the alternate mode is used, the blanking signal is used for switching instead of the output signal of the chopping oscillator.

HOR phase adjust is a 360 degree continuous adjuster. It is used to generate four signals which are shifted 90 degrees to one another using the phase shifter (Q1 through Q3), vector synthesis using the potentiometer (R117), and continuously vary them 360 degrees.

SCALE INTEN: The oscillator (Q12) starts oscillating when the SCALE INTEN is turned ON. Then, the oscillator output is send to the CRT instead of the Y signal uniformly illuminate the screen.

X-Y recorder circuit is used to convert the fluctuating speed of Y signal to approximately 1/1000 or 1/2000 using the sampling method, thereby

enabling the image to be measured that is displayed on the CRT to be recorded by the X-Y recorder.

The output of the saw-tooth wave generator (Q29) with approximately 20 sec (or 40 sec) repetitive cycle and the HOR signal are compared (Q37), the sampling pulse (Q38) is generated at their cross point, with which the sample hold circuit is driven.

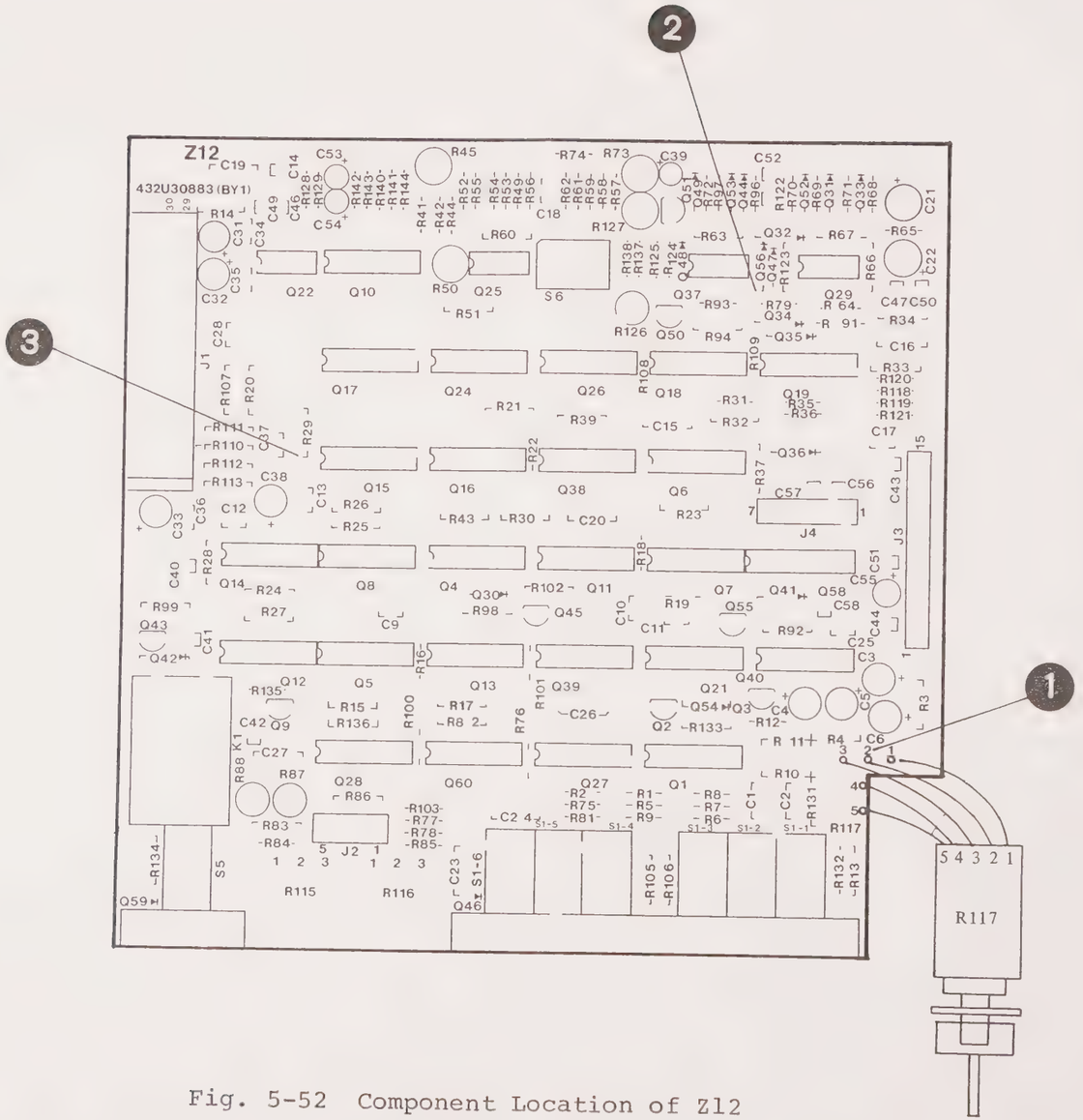


Fig. 5-52 Component Location of Z12

HOR GAIN
BLANKING ON/OFF
SCALEINTEN ON/OFF
BLNK SIG(to CRT)
BLNK SIG from Z4
Y SIGNAL
X SIGNAL
+5V
-12V
+12V

J3 DF1-15PZ.54DSA

Q58 TC4053P

CRT CHOPPING OSCILLATOR

1/3 DIVIDER

Q15 TC4066BP

Q16 TC4066BP

Q17 TC4066BP

HOR PHASE ADJUST

X PHASE

SCALE INTEN OSCILLATOR

XY RECORDERCAL SIGNAL

3 [SCALE INTEN: ON]

H: 1 μsec/DIV
V: 0.5 V/DIV

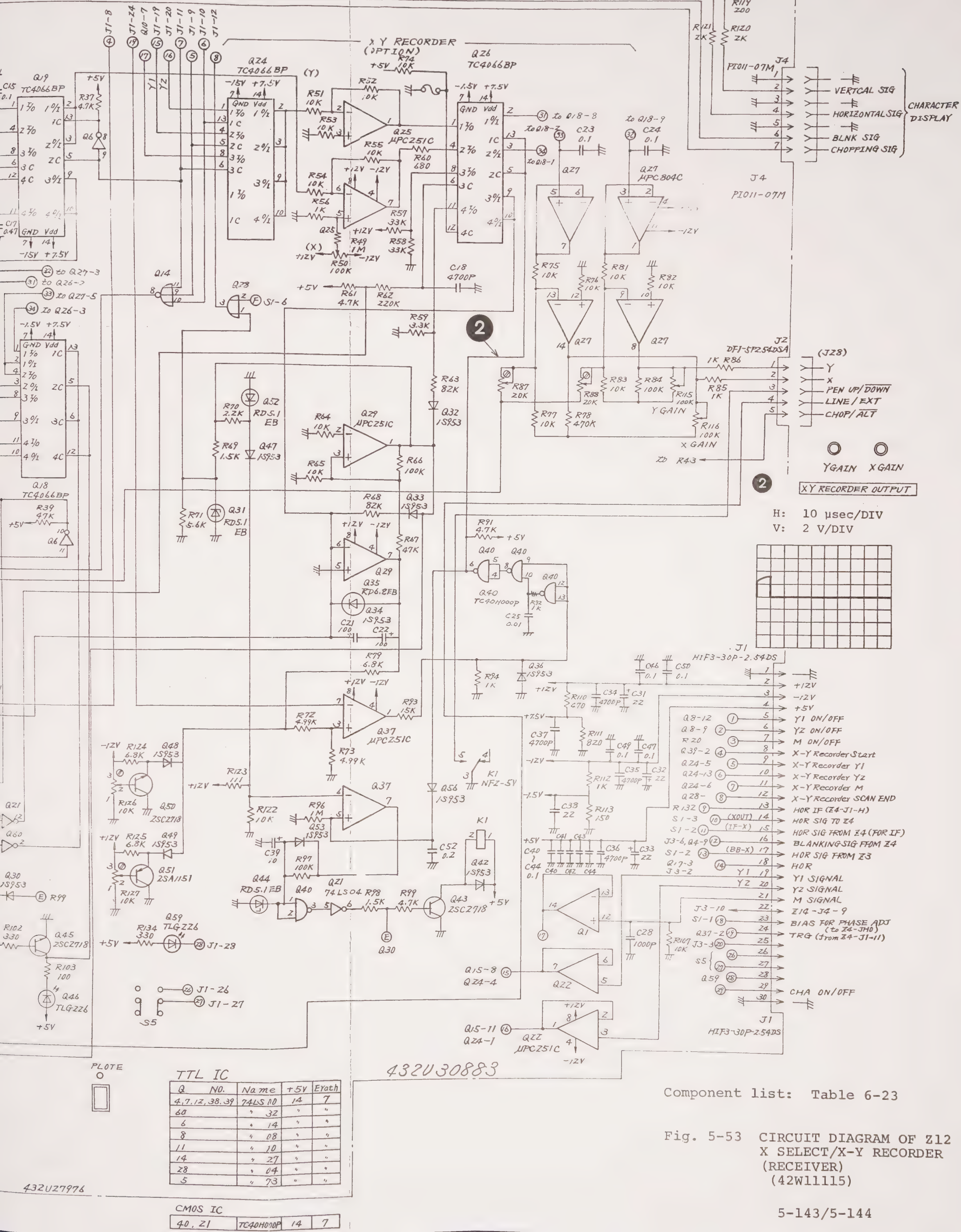
1 [X SELECT: LINE]

H: 5 msec/DIV
V: 1 V/DIV

X SELECT
IF
BB
EXT/LINE

XY RECORDER OUTPUT
40sec
20sec
COPY
CAL

Z12 X SELECT/X-Y RECORDER



TTL IC

Q NO.	Name	+5V	Eyath
4,7,12,38,39	74LS10	14	7
60	" 32	"	"
6	" 14	"	"
8	" 08	"	"
11	" 10	"	"
14	" 27	"	"
28	" 04	"	"
5	" 73	"	"

CMOS IC

40, 21	TC40H000P	14	7

432U30883

432U27976

Component list: Table 6-23

Fig. 5-53 CIRCUIT DIAGRAM OF Z12 X SELECT/X-Y RECORDER (RECEIVER) (42W11115)

5.3.14 Z13 CRT DRIVER

(1) Circuit description

This circuit consists of a vertical AMP, horizontal AMP, high voltage generator circuit, and blanking circuit.

VERTICAL AMP (Q6 through Q11) is a dc amplifier with a voltage gain of approximately 36 dB.

HOR AMP (Q13 through Q18) is a dc amplifier with a voltage gain of approximately 45 dB.

High voltage generator circuit generates high voltages for driving each electrode of the CRT. ac current of approximately 20 kHz is generated by the DC-AC converter (Q28, Q29), which is converted to high voltage by the high voltage transformer (T1).

BLANKING circuit is the circuit for erasing the retrace of the image to be measured that is displayed on the CRT. The INTENSITY circuit (Q22 through Q24) is turned ON by the blanking signal (J1-5) to lower the first grid voltage of the CRT for erasing the bright lines.

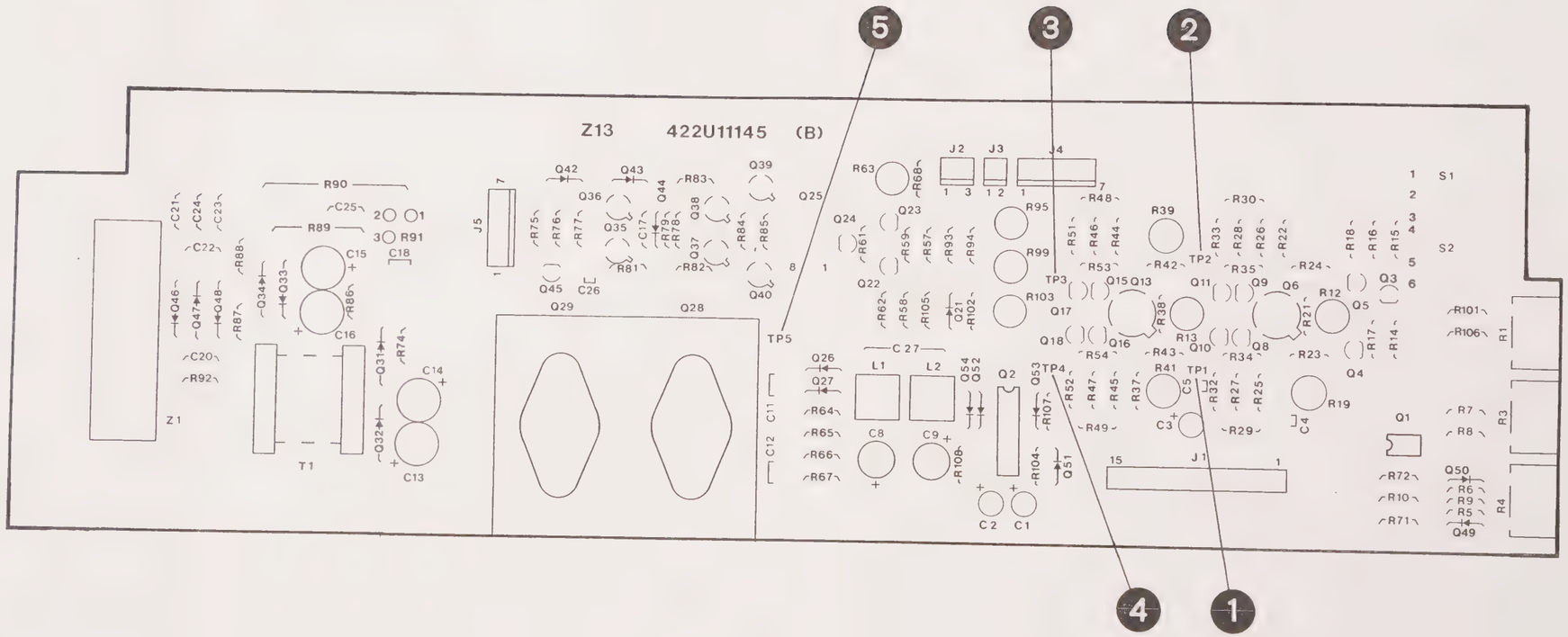
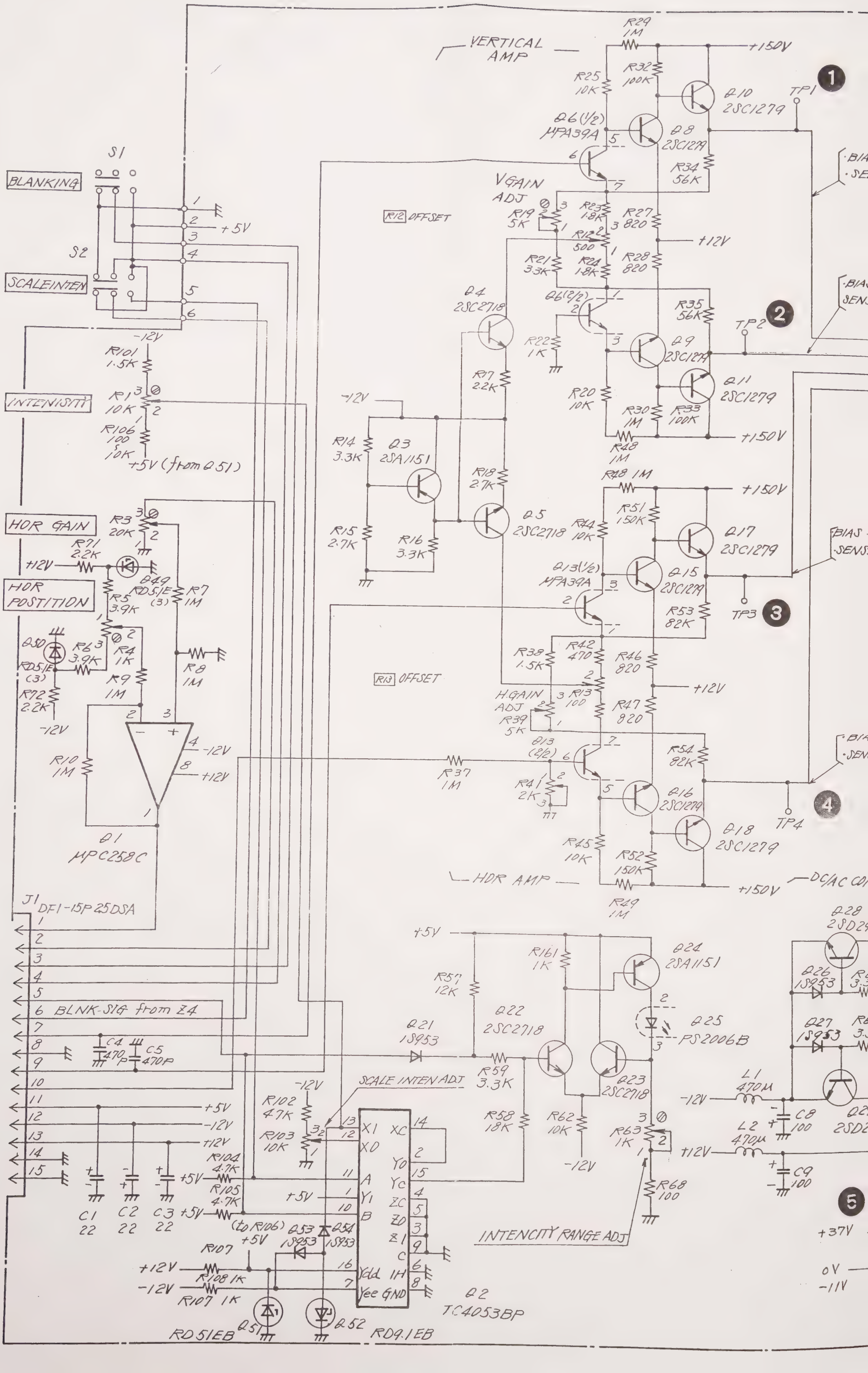
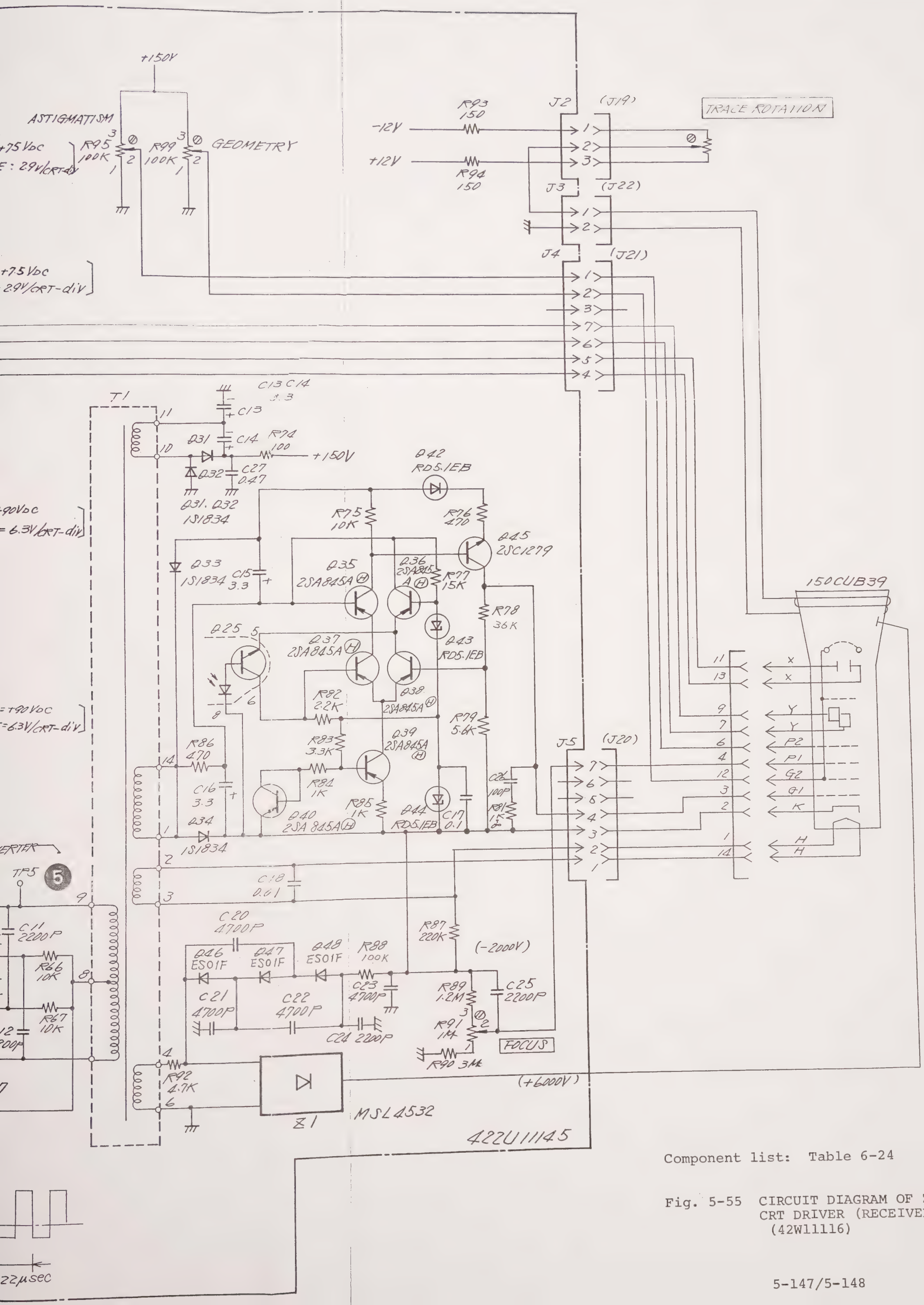


Fig. 5-54 Component Location of Z13


VERTICAL AMP
HOR AMP
S1
S2
BLANKING
SCALEINTEN
INTENISITI
HOR GAIN
HOR POSTITION
+5V
-12V
+12V
+150V
R29 1M
R25 10K
R32 100K
Q10 2SC1279
TP1
Q6(1/2) μPA39A
Q8 2SC1279
R34 56K
VGAIN ADJ
R19 5K
R23 1.8K
R27 820
R12 OFFSET
R12 500
R21 3.3K
R24 1.8K
R28 820
Q4 2SC2718
Q6(2/2)
R35 56K
TP2
R22 1K
Q9 2SC1279
R17 2.2K
R20 10K
Q11 2SC1279
R30 1M
R33 100K
R48 1M
R14 3.3K
Q3 2SA1151
R18 2.7K
R15 2.7K
R16 3.3K
Q5 2SC2718
R48 1M
R51 150K
R44 10K
Q17 2SC1279
Q13(1/2) μPA39A
Q15 2SC1279
TP3
R53 82K
R38 1.5K
R42 470
R46 820
R13 OFFSET
H.GAIN ADJ
R39 5K
R13 100
R47 820
Q13 (2/2)
R37 1M
R41 2K
R54 82K
Q16 2SC1279
TP4
Q18 2SC1279
R45 10K
R52 150K
R49 1M
R3 20K
R71 2.2K
Q49 RD5.1E (3)
R7 1M
R5 3.9K
Q50 RD5.1E (3)
R6 3.9K
R4 1K
R8 1M
R72 2.2K
R9 1M
R10 1M
Q1 μPC258C
R101 1.5K
R1 10K
R106 100
10K
+5V (from Q51)
J1 DF1-15P 25DSA
BLNK-SIG from Z4
C4 470P
C5 470P
C1 22
C2 22
C3 22
R102 47K
R103 10K
R104 4.7K
R105 4.7K
(to R106)
SCALE INTEN ADJ
INTENCITY RANGE ADJ
Q53 1S953
Q54 1S953
R107
R108 1K
R107 1K
Q51 RD5.1EB
Q52 RD9.1EB
Q2 TC4053BP
X1
X0
XC
Y0
Yc
ZC
Z0
Z1
C
A
Y1
B
Vdd
1H
Vee
GND
Q21 1S953
Q22 2SC2718
R57 12K
R161 1K
Q24 2SA1151
Q25 PS2006B
R59 3.3K
Q23 2SC2718
R58 18K
R62 10K
R63 1K
R68 100
L1 470μ
L2 470μ
C8 100
C9 100
Q28 2SD2
Q26 1S953
Q27 1S953
+37V
0V
-11V
DC/AC CO
BIAS SENS
1
2
3
4
5



Component list: Table 6-24

Fig. 5-55 CIRCUIT DIAGRAM OF Z1 CRT DRIVER (RECEIVER) (42W11116)

5.3.15 Z14 POWER SUPPLY

(1) Circuit description

This circuit consists of five dc regulated power supply circuits of ±5 V, ±12 V, and +5 V (A). This circuit is also used to send the line signal to the Z12 X selector via the LPF (Q6).

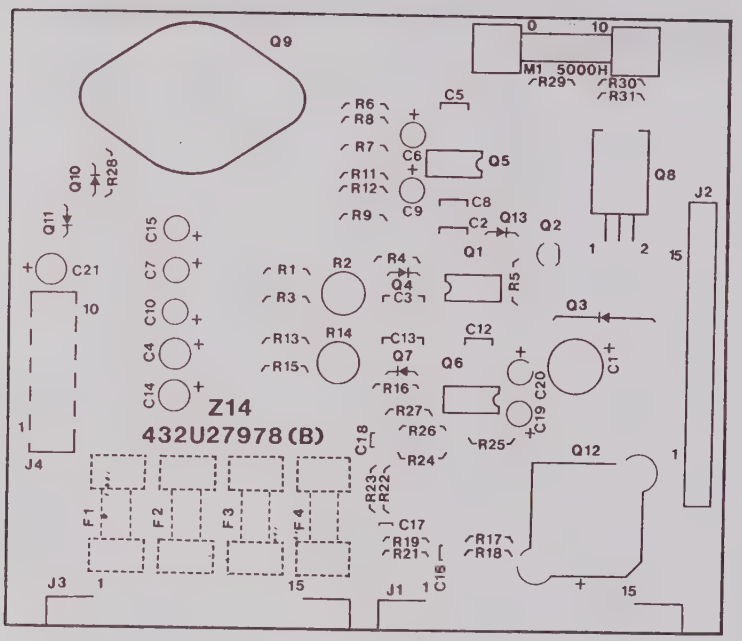
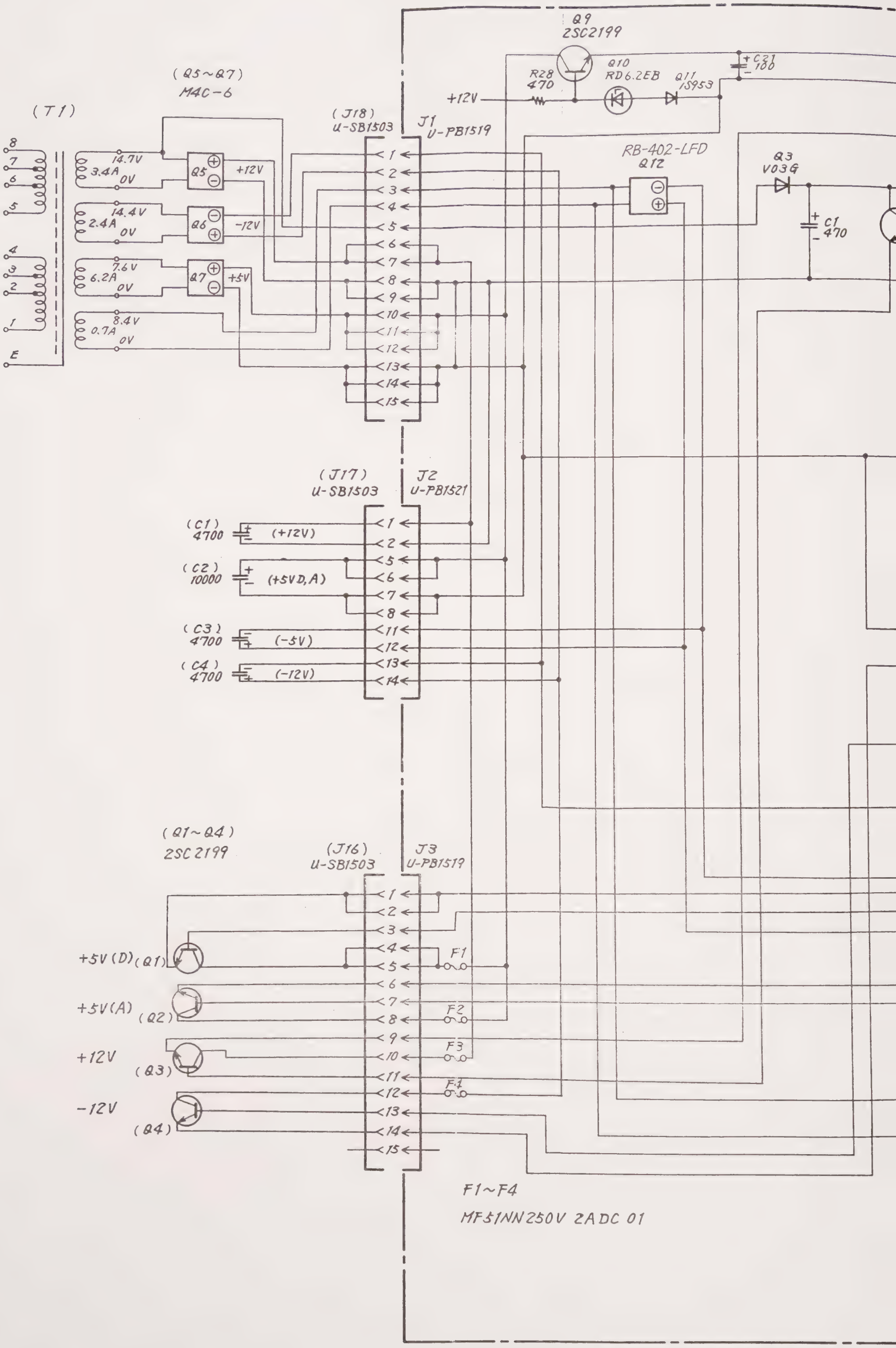


Fig. 5-56 Component Location of Z14


(T1)
(Q5~Q7)
M4C-6
8
7
6
5
4
3
2
1
E
14.7V
3.4A
0V
Q5
+12V
14.4V
2.4A
0V
Q6
-12V
7.6V
6.2A
0V
Q7
+5V
8.4V
0.7A
0V
(J18)
U-SB1503
J1
U-PB1519
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
Q9
2SC2199
R28
470
Q10
RD6.2EB
Q11
1S953
+12V
C21
100
RB-402-LFD
Q12
Q3
V03G
C1
470
(J17)
U-SB1503
J2
U-PB1521
(C1)
4700
(+12V)
(C2)
10000
(+5VD,A)
(C3)
4700
(-5V)
(C4)
4700
(-12V)
(Q1~Q4)
2SC2199
(J16)
U-SB1503
J3
U-PB1519
+5V(D)
(Q1)
+5V(A)
(Q2)
+12V
(Q3)
-12V
(Q4)
F1
F2
F3
F4
F1~F4
MF51NN250V 2ADC 01

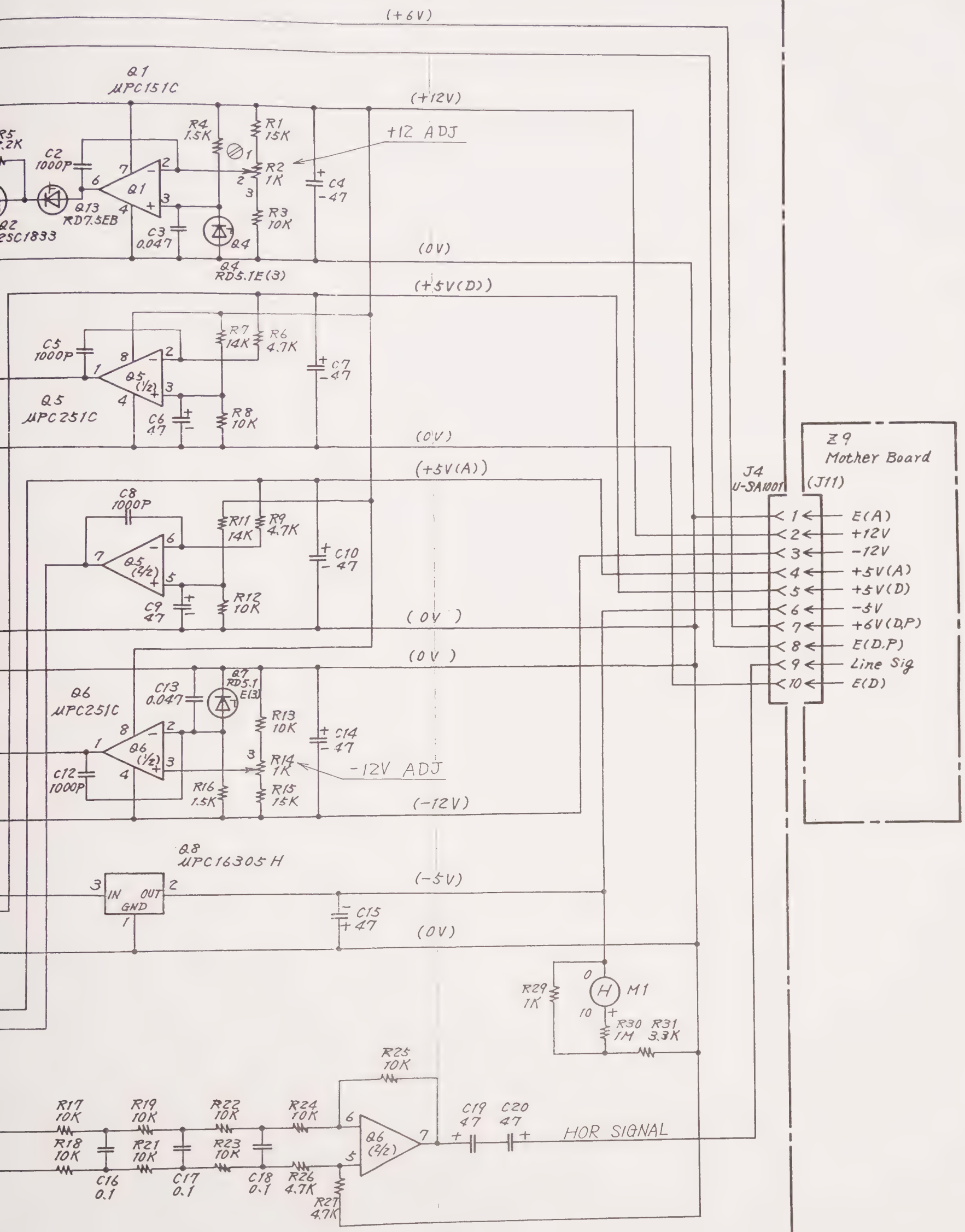


Fig. 5-57 CIRCUIT DIAGRAM OF Z14
POWER SUPPLY (RECEIVER)
(42W9974)

5.3.16 Z15 AVG

This circuit is used to normalize the image to be measured in conjunction with the Z1 RANGING AND AVG circuit. This circuit consists of the adder (Q1 through Q3), memory (Q6, Q7), D/A converter (Q14 through Q18, Q23 through Q27), and address counter (Q29).

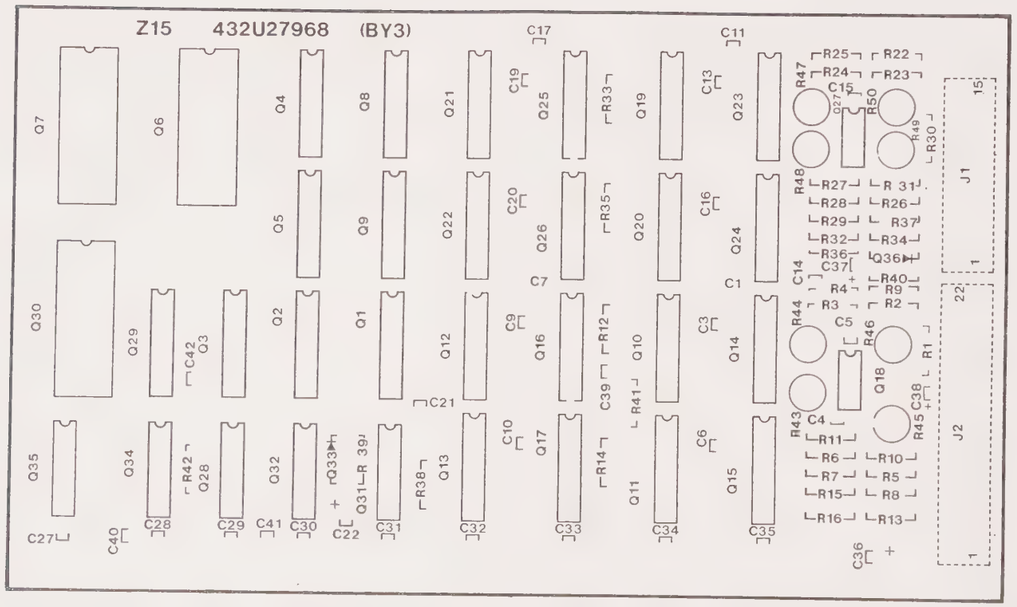


Fig. 5-58 Component Location of Z15

ADDER

MEMORY

LATCH

LATCH

Z1 -J5

J1
U-SA1501

J2-11

J2-10

J2-9

J2-5

J2-6

Q1
74LS283

Q2
74LS283

Q3
74LS283

Q4
74LS367A

Q5
74LS367A

Q6
HM6116P-2

Q7
HM6116P-2

X1
Q8
74LS174

Q9
74LS174

Q10
74LS174

Q11
74LS174

Q12
74LS174

Q13
74LS174

C39
470P

R41
330

Z7

T5

X1.
Q8, Q9 with IC Socket

Q28
74LS293

Q29
TC40408P

Q30
74154

Q31
74LS00

Q32
TC40H000P

R42
330

C42
470P

C40
1000P

C41
1000P

C22
22

R38
330

C21
220P

R39
100K

Q33
1S953

Q30-4

T3

T15

T7

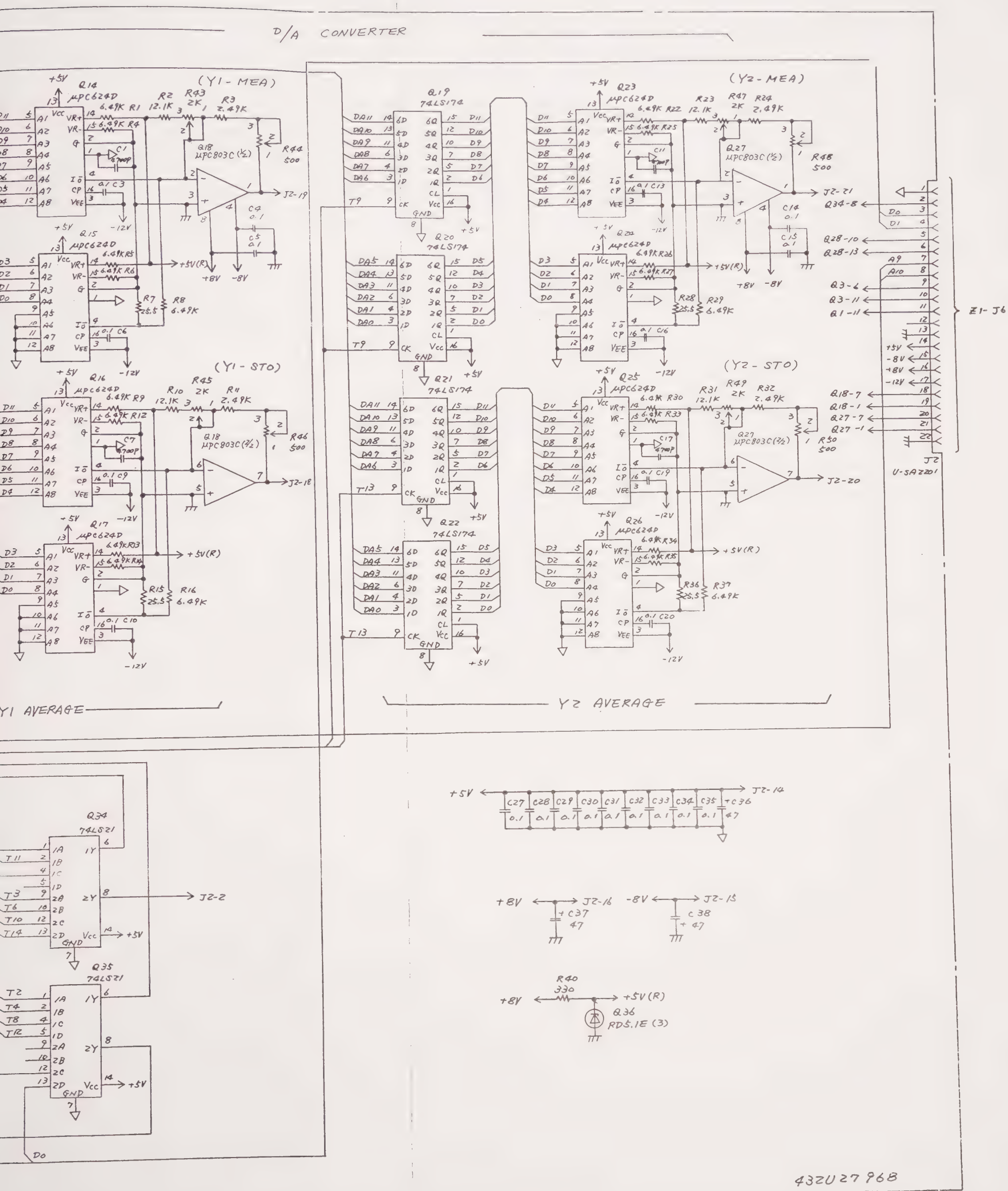
DECODER

ADDRESS COUNTER

D1

IC

	Name	+5V	Earth
Q31	74LS00	14	7
Q32	TC40H000P	14	7



Component list: Table 6-26

Fig. 5-59 CIRCUIT DIAGRAM OF Z15 AVG (RECEIVER) (42W9874)

5.3.17 Z8 GP-IB/Z18 CONNECTOR BOARD (OPTION)

(1) Circuit description

This circuit transmits and receives the information to and from GPIB interface bus (IEEE Std 488-1978).

This circuit is controlled by Z7 CPU.

This circuit consists of GPIB Interface Controller (Q13, RAM (Q6, Q7), ROM (Q20), Decorder and Buffer, and is connected to 8085A CPU (Z7) through J2.

CPU address allocations are shown in Table 5-6.

Table 5-6 List of CPU address allocations

Item	Circuit Reference	State																		Address
		IO/$\overline{M}$	$\overline{RD}$	$\overline{WR}$	A15	A14	A13	A12	A11	A10	A9	A8	A7	A6	A5	A4	A3	A2	A1	A0	
1. Data Memory																					
(1) RAM No.1 2k Byte	Q6	0	-	-	0	1	0	0	0												4000H ∫ 47FFH
(2) RAM No.2 2k Byte	Q7	0	-	-	0	1	0	0	1												4800H ∫ 4FFFH
2. PROGRAM																					
ROM 16k Byte	Q52	0	-	-	1	1	0	0													C000H ∫ FFFFH
3. I/O PORT																					
(1) 8291A Controller	Q13	0	-	-	0	1	1	1	1	0	1	0	0	0							7A0*H
(2) GP-IB Address	Q16	0	0	-	0	1	1	1	1	0	1	0	0	1							7A4*H
(3) AVG-M L Byte	Q18	0	0	-	0	1	1	1	1	0	1	0	1	0							7A8*H
(4) AVG-M H Byte	Q17	0	0	-	0	1	1	1	1	0	1	0	1	1							7AC*H
(5) AVG-M CLOCK	Q12	0	-	0	0	1	1	1	1	0	1	1	0	1							7B4*H
(6) Sentronics Data Output	Q22	0	-	0	0	1	1	1	1	0	1	1	1	0							7B8*H
(7) Sentronics Busy Flag	Q17	0	0	-	0	1	1	1	1	0	1	1	1	1							7BC*H

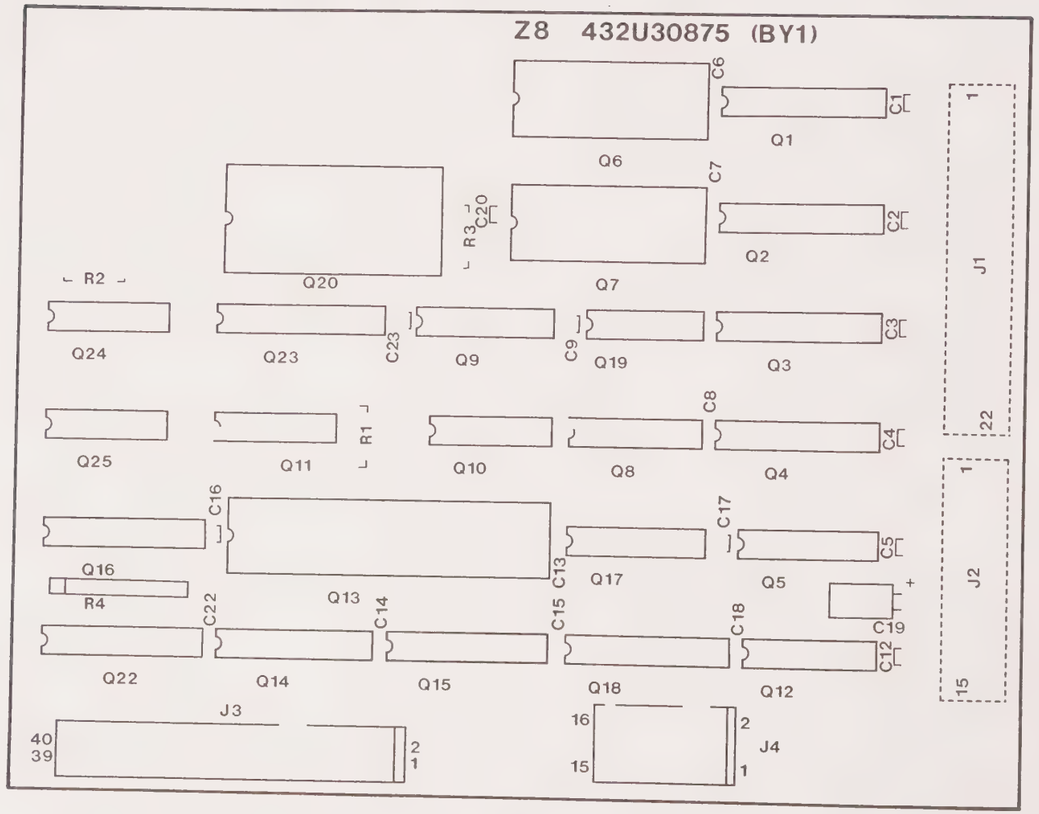


Fig. 5-60 Component Location of Z8

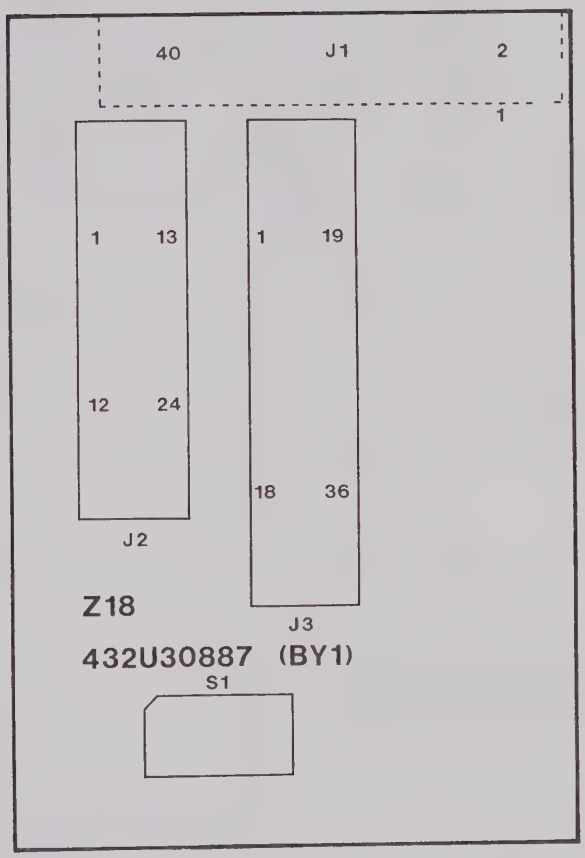
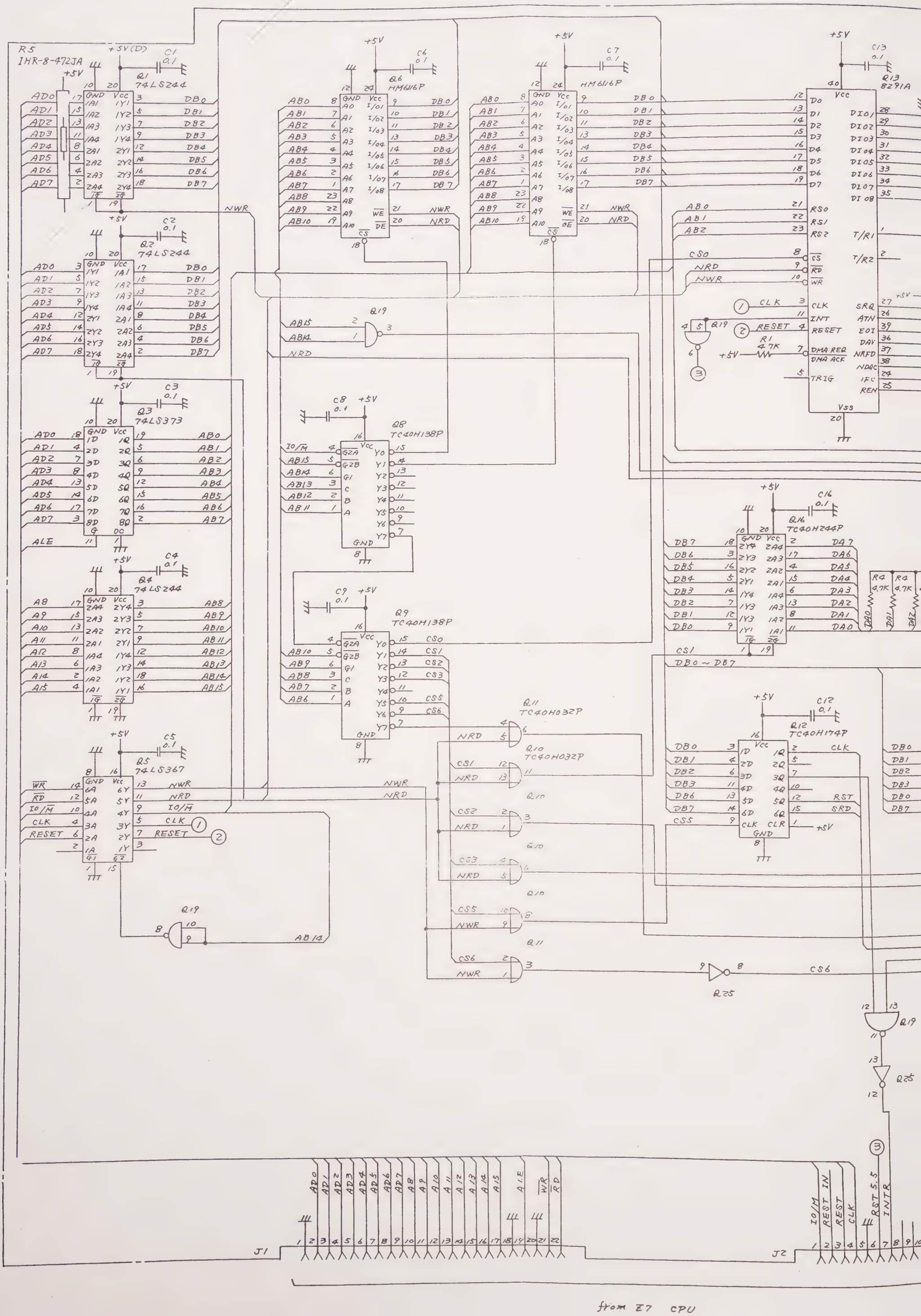
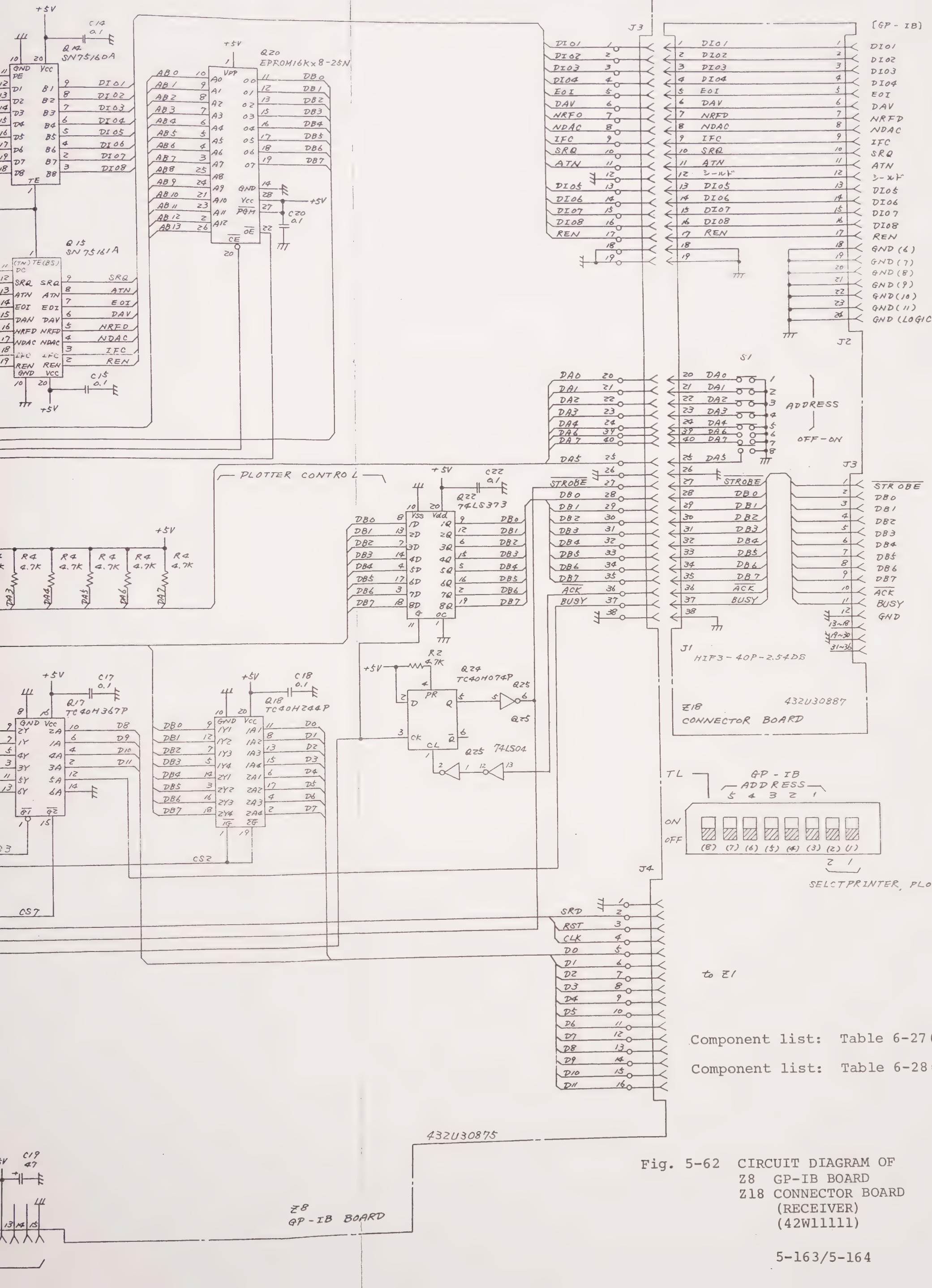


Fig. 5-61 Component Location of Z18


R5
IHR-8-472JA
+5V(D)
C1 0.1
Q1 74LS244
AD0
AD1
AD2
AD3
AD4
AD5
AD6
AD7
DB0
DB1
DB2
DB3
DB4
DB5
DB6
DB7
NWR
C2 0.1
Q2 74LS244
C3 0.1
Q3 74LS373
ALE
AB0
AB1
AB2
AB3
AB4
AB5
AB6
AB7
C4 0.1
Q4 74LS244
A8
A9
A10
A11
A12
A13
A14
A15
AB8
AB9
AB10
AB11
AB12
AB13
AB14
AB15
C5 0.1
Q5 74LS367
WR
RD
IO/M
CLK
RESET
NWR
NRD
IO/M
CLK (1)
RESET (2)
Q19
AB14
C6 0.1
Q6 HM6116P
C7 0.1
HM6116P
NRD
C8 0.1
Q8 TC40H138P
C9 0.1
Q9 TC40H138P
CS0
CS1
CS2
CS3
CS5
CS6
Q11 TC40H032P
Q10 TC40H032P
C13 0.1
Q13 8291A
Vcc
Vss
D0
D1
D2
D3
D4
D5
D6
D7
DIO1
DIO2
DIO3
DIO4
DIO5
DIO6
DIO7
DIO8
RS0
RS1
RS2
T/R1
T/R2
CS
RD
WR
CLK
INT
RESET
DMA REQ
DMA ACK
TRIG
SRQ
ATN
EOI
DAV
NRFD
NDAC
IFC
REN
R1 4.7K
C16 0.1
Q16 TC40H244P
R4 4.7K
DA0
DA1
DA2
DA3
DA4
DA5
DA6
DA7
C12 0.1
Q12 TC40H174P
RST
SRD
Q25
RST5.5
INTR
J1
J2
IO/M
REST IN
REST
CLK
from Z7 CPU



Component list: Table 6-27(Z8)

Component list: Table 6-28(Z18)

Fig. 5-62 CIRCUIT DIAGRAM OF
Z8 GP-IB BOARD
Z18 CONNECTOR BOARD
(RECEIVER)
(42W11111)

5.3.18 CHARACTER DISPLAY

(1) Circuit description

This circuit displays the measurement parameters and results on the CRT in alphabetic characters.

This circuit also displays on the CRT as graphics input through the GP-IB (for example, reference line, etc.).

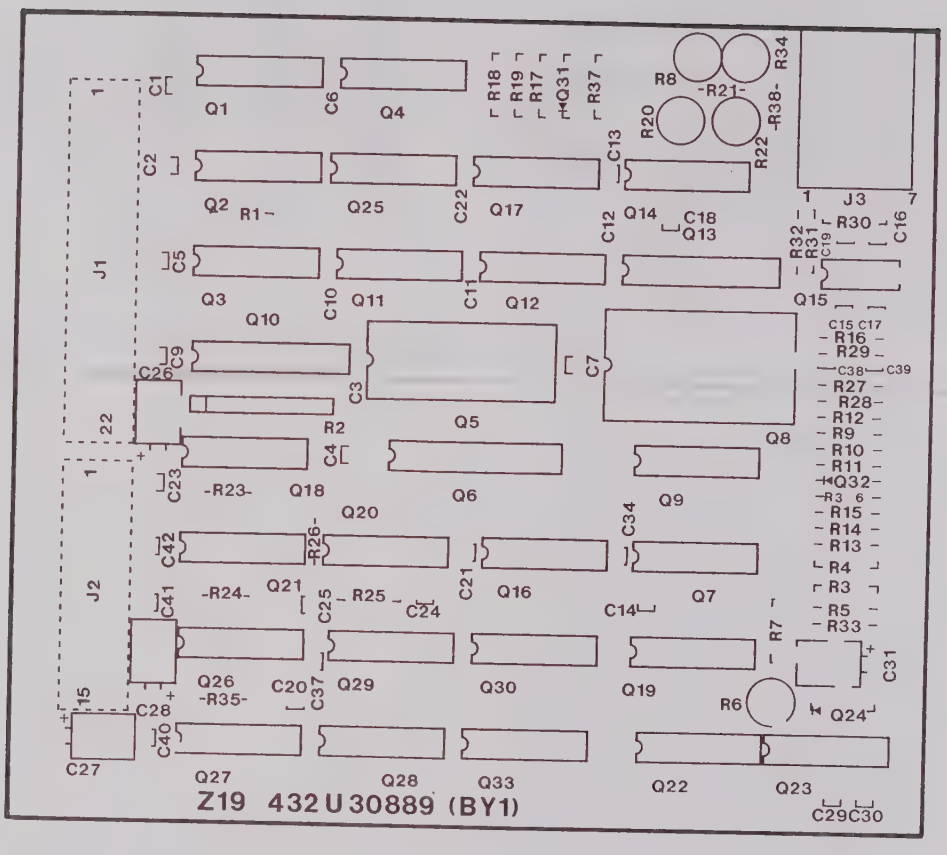
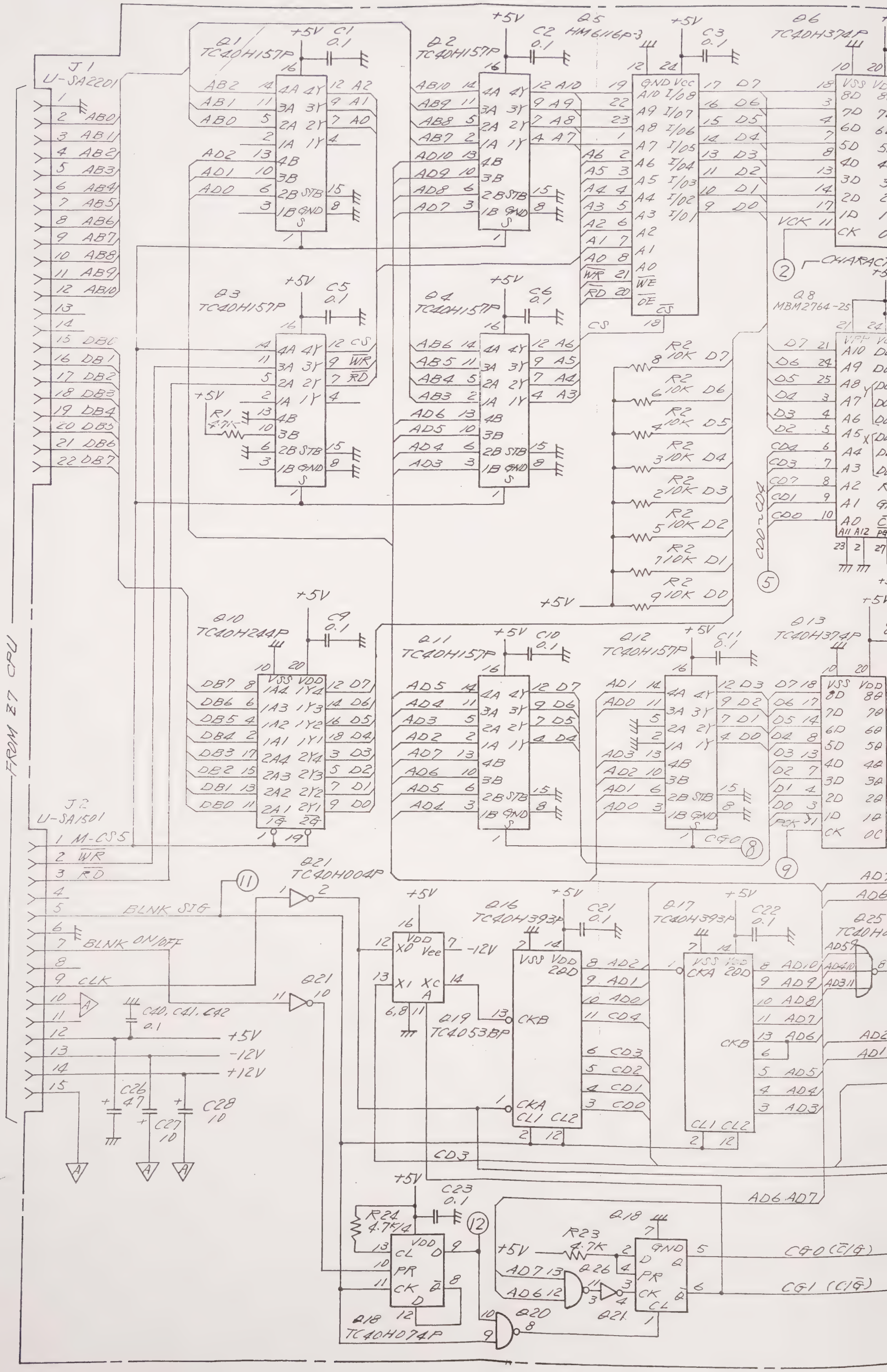
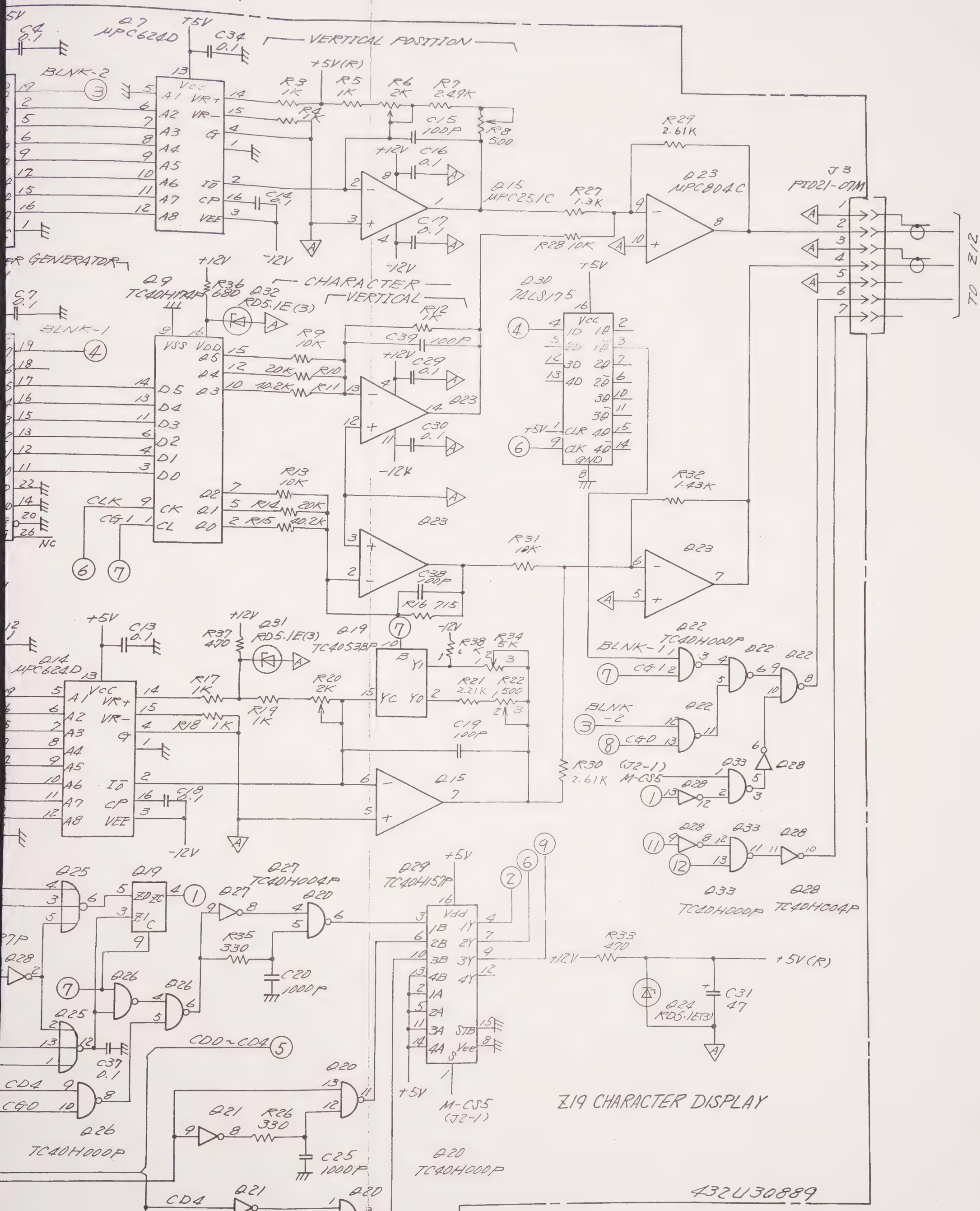


Fig. 5-63 Component Location of Z19


FROM Z7 CPU
J1
U-SA2201
J2
U-SA1501
Q1 TC40H157P
Q2 TC40H157P
Q3 TC40H157P
Q4 TC40H157P
Q5 HM6116P-3
Q6 TC40H374P
Q8 MBM2764-25
Q10 TC40H244P
Q11 TC40H157P
Q12 TC40H157P
Q13 TC40H374P
Q16 TC40H393P
Q17 TC40H393P
Q18 TC40H074P
Q19 TC4053BP
Q20
Q21 TC40H004P
R1 4.7K
R2 10K D7
R2 10K D6
R2 10K D5
R2 10K D4
R2 10K D3
R2 10K D2
R2 10K D1
R2 10K D0
R23 4.7K
R24 4.7K/4
C1 0.1
C2 0.1
C3 0.1
C5 0.1
C6 0.1
C9 0.1
C10 0.1
C11 0.1
C21 0.1
C22 0.1
C23 0.1
C40, C41, C42 0.1
C26 47
C27 10
C28 10
+5V
-12V
+12V
BLNK SIG
BLNK ON/OFF
CLK
CHARACT
CS
WR
RD
VCK
CD0~CD4
CG0 (C/G)
CG1 (C/G)
AD6 AD7



Component list: Table 6-29

Fig. 5-64 CIRCUIT DIAGRAM OF Z19 CHARACTER DISPLAY (RECEIVER) (42W11119)

SECTION 6

REPLACEABLE PARTS

6.1 INTRODUCTION

This section contains information relative to ordering replacement components. The following table shows circuit references (hereinafter CKT REF) and abbreviations used for components given in the component list. In the component list, the quantity of each component is one so far as no quantitative description is given in the "NOTE" column.

(1) Circuit reference

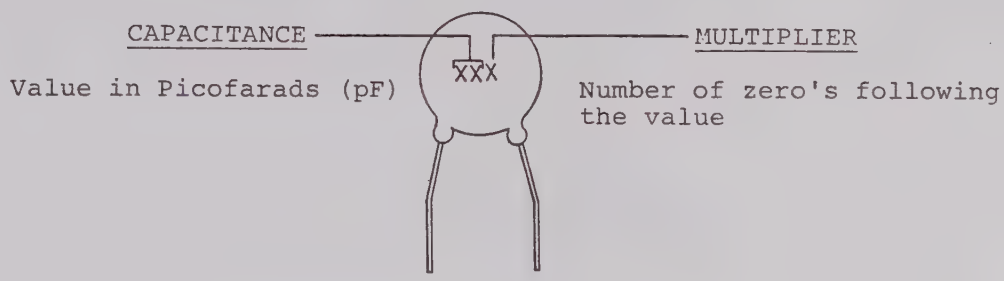
AT: Attenuator	K: Relay	Q: Transistor, Diode, Rectifier, IC	T: Transformer
C: Capacitor	L: Coil	R: Resistor	V: Neon lamp, Vaccumtube
F: Fuse	M: Meter, timer	S: Switch	Z: Unit
J: Jack, plug, connector	P: Lamp		

(2) Abbreviations

A	: amperes	J-FET	: junction FET	PNP	: positive-negative-positive
Att, *R* var	: attenuator variable using film resistive elements	k	: kilo ($\times 10^{3}$)	p-p, pp	: peak to peak value
BL	: boundary layer	LED	: light emitting diode	RFC	: RF choke
				R-lamp	: resistor lamp
Cer	: ceramic	M	: mega ($\times 10^{6}$)	rms	: effective value (root means square)
CF	: carbon film	m	: milli ($\times 10^{-3}$)		
Comp	: composition	MF	: metallized film	SBD	: shottky barrier diode
CRT	: cathode-ray tube	MOS-FET	: metal oxide semi-conductor FET	SCR	: sillicon controlled rectifier
		M paper	: metallized paper		
Di	: diode	M plast	: metallized plastic film	Si	: sillicon
DIL type	: dual-in line type			SRD	: step recovery diode
		Multi	: multiplying		
Elect	: electrolyte aluminum			Tant	: tantalum
		N ch	: N channel	Tr	: transistor
F	: farad	non-lin	: non-linear taper	Trans	: transformer
FET	: field effect transistor	Non-pol	: non-polarity		
		NPN	: negative-positive-negative	μ	: micro ($\times 10^{-6}$)
G	: ground				
Ge	: germanium			V	: volt
		Ω	: ohms	Var	: variable
H	: henry				
Hz	: hertz	P	: pico ($\times 10^{-12}$)	WW	: wire wound
		Plast	: plastic film		
IC	: integrated circuit	PMTR	: potentiometer	XTAL	: crystal
IEC	: Applicable to IEC Safety Standard				

6.2 METHOD OF READING CAPACITORS/RESISTORS

6.2.1 Capacitor Identification



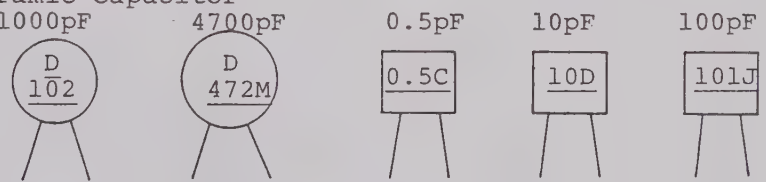
EXAMPLES: 103 = 10,000pF = 10^{-8}F or 0.01μF
302 = 3,000pF = $3x10^{-9}$F or 0.003μF
676 = 67,000,000pF = $67x10^{-6}$F or 67μF

(a) Ceramic capacitor, polyester capacitor

Indication	0.5	1	10	101	102	103	104
Capacity	0.5pF	1pF	10pF	100pF	1000pF	0.01μF	0.1μF

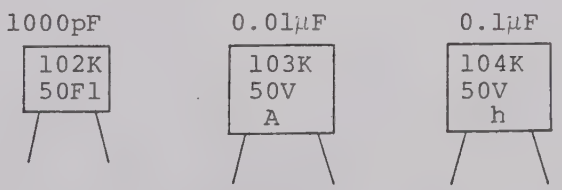
Example:

Ceramic Capacitor



Capacity values are always underlined.

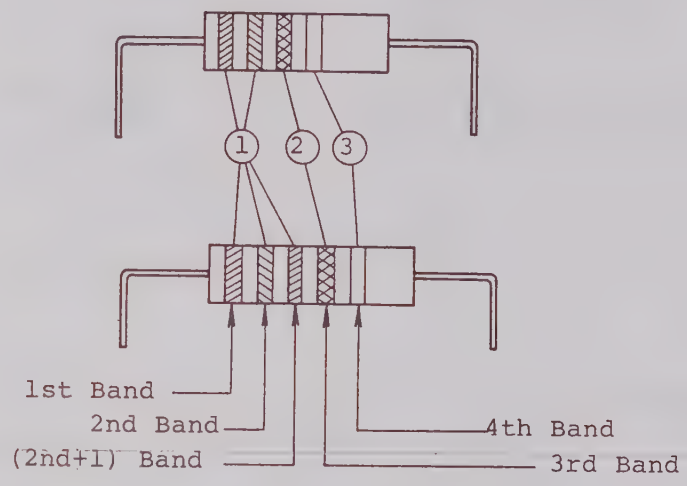
Polyester Capacitor



(b) Tantalum capacitor. Metallized capacitor and Electrolytic capacitor

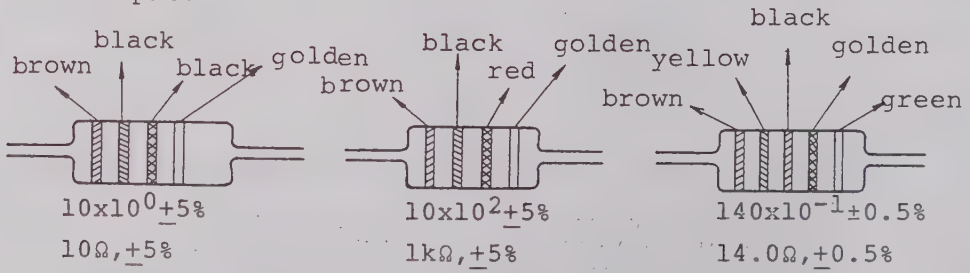
Indication	OR47	010	100	101
Capacity	0.47μF	1μF	10μF	100μF

6.2.2 Resistor Identification



	①		②	③
COLOR	Figure		Multiplier	Tolerance
	1st	2nd	3rd	4th
Black	0	0	$x10^0$	-
Brown	1	1	$x10^1$	-
Red	2	2	$x10^2$	-
Orange	3	3	$x10^3$	-
Yellow	4	4	$x10^4$	-
Green	5	5	$x10^5$	±0.5%
Blue	6	6	$x10^6$	-
Purple	7	7	$x10^7$	-
Grey	8	8	$x10^8$	-
White	9	9	$x10^9$	-
Gold	-	-	$x10^{-1}$	±5%
Silver	-	-	$x10^{-2}$	±10%
-----	-	-		±20%

For Example:



6.3 ORDERING INFORMATION

Upon ordering components, please give the following descriptions by referring to the C.L. (Component List).

Item	Example
(1) Name of instrument	MICROWAVE SYSTEM ANALYZER ME453K/L/M ME538K/L/M
(2) Name of component	COMPONENT LIST OF COUNTER (Z2)
(3) CKT REF	C21
(4) Name of component	ECQ-M1H 102KZ Note: Part nem is given in parentheses ( ) in the C.L. (Component List). Components with asterisks* are those that require factory adjustment upon repairing. When ordering a component or components with asterisk, give full description of the component.
(5) Quantity	1
(6) Serial No. of instrument	M31257

6.4 COMPONENT LIST

Table No.	COMPONENT LIST Name	Drawing No.
6-1	ME453/538 K/L/M TRANSMITTER	44W78307
6-2	IF OSCILLATOR & AMPLIFIER (Z1)	44W78308
6-3	COUNTER (Z2)	44W78309
6-4	SWEEP OSCILLATOR & BB AMPLIFIER (Z3)	44W78310
6-5	BB OSCILLATOR (Z4)	44W78311
6-6	CRYSTAL OSCILLATOR & BB SWEEPER (Z5)	44W73733
6-7	MOTHER BOARD (Z8)	44W78313
6-8	LED BOARD (Z9)	44W78314
6-9	FRONT BOARD (Z10)	44W78315
6-10	POWER SUPPLY (Z11)	44W73737
6-11	SWITCH BOARD (Z12)	44W78317
6-12	ME453/538 K/L/M RECEIVER	44W78289
6-13	RANGING AND AVG (Z1)	44W78290
6-14	PHASE DETECTOR (Z2)	44W78291
6-15	BB DETECTOR (Z3)	44W78292
6-16	DISCRIMINATOR (Z4)	44W78293
6-17	IF MIX AND RETURN LOSS (Z5)	44W78294
6-18	MARKER AND SPECTRUM (Z6)	44W78295
6-19	CPU (Z7)	44W78296
6-20	MOTHER BOARD (Z9)	44W78298
6-21	OPERATING/LED BOARD (Z10)	44W78299
6-22	LED DRIVER (Z11)	44W78300
6-23	X SELECT, X-Y RECORDER (Z12)	44W78301
6-24	CRT DRIVER (Z13)	44W78302
6-25	POWER SUPPLY (Z14)	44W73726
6-26	AVG (Z15)	44W70553
6-27	GP-IB BOARD (Z8) (OPTION)	44W78297
6-28	CONNECTOR BOARD (Z18)	44W78305
6-29	CHARACTER DISPLAY (Z19)	44W78306

Table 6-1 COMPONENT LIST OF ME453K/L/M, ME538K/L/M TRANSMITTER

CKT REF	DESCRIPTION	RATING	NOTE
AT1	Att, R var,(ARD352BNC 20S75Ω70dB8PL)	10dB x 7	44R80361
AT2	Att, R var,(ARD352BNC 20S75Ω10dB11PL)	1dB x 10	44R80361
C 1	Elect,(CE62C1C103)	10000μF,-10/+50%,16V	
C 2	Elect,(CE62C1V472)	4700μF,-10/+50%,35V	
C 3	Elect,(CE62C1V222)	2200μF,-10/+50%,35V	
C 4	Elect,(CE62C1C222)	2200μF,-10/+50%,35V	
C 5	Elect,(CE02W1V471)	470μF,±20%,35V	
C 6	Elect,(CE02W1V471)	470μF,±20%,35V	
F 1	Fuse,(MF51NN250V***AAC05)	***A	
F 2	Fuse,(MF51NN250V***AAC05)	***A	
J 1	Inlet,(8843-2SPFL4/364)		
J 2	Connector,(U-SB1503)	15 pins	
J 3	Connector,(U-SB1503)	15 pins	
J 4	Connector,(U-SA1003)	10 pins	
J 5	Plug,(BNC-P620)		
J 6	Plug,(BNC-P620)		
J 7	Plug,(BNC-P620)		
J 8	Plug,(BNC-P620)		
J 9	Plug,(BNC-P620)		
J10	Panel jack,(SP-3CPJ) Panel jack,(J3WE-2)		K type L/M type
J11	Plug,(BNC-P620)		
J12	Panel jack,(SP-3CPJ) Panel jack,(J3WE-2)		K type L/M type
J13	Connector,(PI011-2F)		
J14	Connector,(PI011-2F)		
J15	Not assigned		
J16	Connector,(PI011-2F)		
J17	Connector,(PI011-2F)		
J18	Connector,(PI011-2F)		
J19	Connector,(PI011-2F)		
J20	Connector,(PI011-2F)		
J21	Connector,(PI011-2F)		
J22	Connector,(PI011-2F)		
J23	Plug,(BNC-P1-NI)		
J24	Not assigned		
J25	Connector, (DF1-15S2.5R24)	15 pins	

( ): Manufacturer's part number

* : Selected at factory

Table 6-1 COMPONENT LIST OF ME453K/L/M, ME538K/L/M TRANSMITTER

CKT REF	DESCRIPTION	RATING	NOTE
J26	Connector, (DF1-5S2.5R24)	5 pins	
J27	Connector, (DF1-10S2.5R24)	10 pins	
J28	Not assigned		
J29	Plug,(BNC-P620)		
J30	Panel jack,(SP-3CPJ) Panel jack,(J3WE-2)		K type L/M type
J31	Not assigned		
J32	Receptacle,(SP-3CR) Receptacle,(J3WE-2)		K type L/M type
J33	Connector, (DF1-20S2.5R24)	20 pins	
J34	Connector, (DF1-25S2.5R24)	15 pins	
J35	Connector,(PI011-2F)		
J36	Connector, (DF1-15S2.5R24)	15 pins	
J37	Not assigned		
J38	Connector,(PI011-2F)		
J39	Connector,(PI011-3F)		
J40	Connector,(PI011-6F)		
J41	Panel jack, (BNC-PJ1-NI)		EXT BB INPUT
J42	Receptacle, (BNC-R-101(NI))		EXT SWEEP INPUT
J43	Receptacle, (BNC-R-101(NI))		SWEEP OUTPUT
J44	Connector, (DF1-20S2.5R24)	20 pins	
J45	Connector, (DF1-10S2.5R24)	10 pins	
J46	Connector, (DF1-10S2.5R24)	10 pins	
J47	Earth Terminal,(34E772)		
Q 1	3 terminal regulator, (S1-3554M)	+5V	
Q 2	3 terminal regulator, (μPC14312H)	+12V	
R 1	Var,MF,(RG161N20SB 1kΩM)	1kΩ,±20%,1/2W	IF OUTPUT LEVEL ±1dB ADJ
R 2	Var,MF,(RG161N15SB 1kΩM)	1kΩ,±20%,1/2W	DEV. ADJ

( ): Manufacturer's part number

* : Selected at factory

Table 6-1 COMPONENT LIST OF ME453K/L/M, ME538K/L/M TRANSMITTER

CKT REF	DESCRIPTION	RATING	NOTE
R 3	Var,MF,(RG161N15SB 100kΩM)	100kΩ,±20%,1/2W	IF SLOPE ADJ
R 4	CF,(ARD25T105J)	1MΩ,±5%,1/4W	
S 1	Power switch,(ESB9997S)		
S 2	Not assigned		
S 3	Mini pushbutton, (IF2UEE)		(44S75597)
S 4	Slide switch, (SL73-6.5H)		
T 1	Power trans,(44T64484)		
V 1	Neon lamp,(BNS-3RU-C)		
Z 1	IF OSCILLATOR & AMPLIFIER		44W78308
Z 2	COUNTER		44W78309
Z 3	SWEEP OSCILLATOR & BB AMPLIFIER		44W78310
Z 4	BB OSCILLATOR		44W78311
Z 5	CRYSTAL OSCILLATOR & BB SWEEPER		44W78312
Z 6	Not assigned		
Z 7	Not assigned		
Z 8	MOTHER BOARD		44W78313
Z 9	LED BOARD		44W78314
Z10	FRONT BOARD		44W78315
Z11	POWER SUPPLY		44W78316
Z12	SWITCH BOARD		44W78317
Z13	ZMB2203-13 NOISE FILTER		

( ): Manufacturer's part number

* : Selected at factory

Table 6-2 COMPCOMPONENT LIST OF IF OSCILLATOR & AMPLIFIER (Z1)

CKT REF	DESCRIPTION	RATING	NOTE
AT 1	Att,(CAT-506)	6dB	
AT 2	Att,(CAT-506)	6dB	
AT 3	Att,(CAT-506)	6dB	
AT 4	Att,(CAT-506)	6dB	
C 1	Cer,(RPE670C472M50V)	4700pF,±20%,50V	
C 2	Cer,(RPD670C472M50V)	4700pF,±20%,50V	
C 3	Cer,(RPD670C472M50V)	4700pF,±20%,50V	Q'ty 2, Parallel
C 4	Cer,(RPD670C472M50V)	47000F,±20%,50V	
C 5	Cer,(RPD670C472M50V)	4700pF,±20%,50V	
C 6	Elect,(CE04W1E470)	47μF,±20%,25V	
C 7	Cer,(RPD670C472M50V)	4700pF,±20%,50V	
C 8	Cer,(CC924CH1H150J)	15pF,±5%,50V	
C 9	Cer,(RPD670C472M50V)	4700pF,±20%,50V	
C10	Cer,(RD340CK0R5CY50)	0.5pF,±0.25pF,50V	
C11	Cer,(RPN710CH471J50V)	470pF,±5%,50V	
C12	Cer,(RPN710CH471J50V)	470pF,±5%,50V	
C13	Cer,(RPD670C472M50V)	4700pF,±20%,50V	
C14	Cer,(RD340CK0R5CY50)	0.5pF,±0.25pF,50V	
C15	Var,Cer,(TZ03R300A)	5.2p to 30pF,100V	
C16	Elect,(CE04W1V100)	10μF,±20%,35V	
C17	Cer,(CC924CH1H050D)	5pF,±0.5pF,50V	
C18	Cer,(CC924CH1H100D)	10pF,±0.5pF,50V	
C19	Cer,(CC924CH1H050D)	5pF,±0.5pF,50V	
C20	Cer,(RPD670C472M50V)	4700pF,±20%,50V	
C21	Cer,(RPD670C472M50V)	4700pF,±20%,50V	
C22	Cer,(CK924C1H104M)	0.1μF,±20%,50V	
C23	Cer,(RPD670C472M50V)	4700pF,±20%,50V	
C24	Cer,(RPD670C472M50V)	4700pF,±20%,50V	
C25	Elect,(CE04W1E470)	47μF,±20%,25V	
C26	Cer,(CC924CH1H150J)	15pF,±5%,50V	
C27	Elect,(CE04W1J010)	1μF,±20%,63V	
C28	Cer,(RPD670C472M50V)	4700pF,±20%,50V	
C29	Plast,(ECQ-M1H104KZ)	0.1μF,±10%,50V	
C30	Cer,(RD340CK010CY50)	1pF,±0.25pF,50V	Q'ty 0 or 1
C31	Cer,(DF553F102PY50)	1000pF,+100/-0%,50V	
C32	Cer,(DF553F102PY50)	1000pF,+100/-0%,50V	
C33	Cer,(DF553F102PY50)	1000pF,+100/-0%,50V	
C34	Cer,(DF553F102PY50)	1000pF,+100/-0%,50V	
C35	Cer,(DF553F102PY50)	1000pF,+100/-0%,50V	
C36	Elect,(CE04W1V220)	22μF,±20%,35V	
C37	Elect,(CE04W1V220)	22μF,±20%,35V	
C38	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V	
C39	Elect,(CE04W1V220)	22μF,±20%,35V	
C40	Cer,(DF553F102PY50)	1000pF,+100/-0%,50V	

( ): Manufacturer's part number

* : Selected at factory

Table 6-2 COMPONENT LIST OF IF OSCILLATOR & AMPLIFIER (Z1)

CKT REF	DESCRIPTION	RATING		NOTE
C41	Elect,(CE04W1J2R2)	2.2μF,±20%,63V		
C42	Elect,(CE04W1J010)	1μF,±20%,63V		
C43	Cer,(RPN710C223M50V)	0.022μF,±20%,50V		
C44	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C45	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C46	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C47	Cer,(RPN710C223M50V)	0.022μF,±20%,50V		
C48	Cer,(RPN710C223M50V)	0.022μF,±20%,50V		
C49	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C50	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C51	Cer,(RPN670C472M50V)	4700pF,±20%,50V		
C52	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C53	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C54	Cer,(RPD670C472M50V)	4700pF,±20%,50V		
C55	Cer,(RPD670C472M50V)	4700pF,±20%,50V		
C56	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C57	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C58	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C59	Cer,(CK924C1H222M)	2200pF,±20%,50V		
C60	Cer,(RPD670C472M50V)	4700pF,±20%,50V		
C61	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C62	Cer,(RPN710C223M50V)	0.022μF,±20%,50V		
C63	Cer,(RPN710C223M50V)	0.022μF,±20%,50V		
C64	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C65	Cer,(RPD670C472M50V)	4700pF,±20%,50V		
C66	Cer,(RPN710C223M50V)	0.022μF,±20%,50V		
C67	Cer,(RPD670C472M50V)	4700pF,±20%,50V		
C68	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C69	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C70	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C71	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C72	Cer,(CK924C1H104N)	0.1μF,±20%,50V		
C73	Cer,(RPN710C223M50V)	0.022μF,±20%,50V		
C74	Cer,(RPD670C472M50V)	4700pF,±20%,50V		
C75	Elect,(CE04W1A470)	47μF,±20%,10V		
C76	Cer,(RPD670C472M50V)	4700pF,±20%,50V		
C77	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V		
C78	Plast,(ECQ-M1H104KZ)	0.1μF,±10%,50V		
C79	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		
C80	Cer,(CC924CH1H330J)	33pF,±5%,50V		
C81	Cer,(CC924CH1H330J)	33pF,±5%,50V		
C82	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V		
C83	Cer,(RD340CK * CY50)	0.5 to 1pF,±0.25pF, 50V		* Q'ty 0 or 1
	Cer,(CC924CK1H020C)	2pF,±0.25pF,50V		* Q'ty 0 or 1
C84	Cer,(RD340CK * CY50)	0.5 to 1pF,±0.25pF, 50V		* Q'ty 0 or 1
	Cer,(CC924CK1H020C)	2pF,±0.25pF,50V		

( ): Manufacturer's part number
* : Selected at factory

Table 6-2 COMPONENT LIST OF IF OSCILLATOR & AMPLIFIER (Z1)

CKT REF	DESCRIPTION	RATING		NOTE
C85	Plast,(ECQ-M1H102KZ)	1000pF,±10%,50V		
C86	Elect,(CE04W1V220)	22μF,±20%,35V		
C87	Plast,(ECQ-M1H333KZ)	0.033μF,±10%,50V		
C88	Elect,(CE04W1V220)	22μF,±20%,35V		
C89	Elect,(CE04W1V220)	22μF,±20%,35V		
C				
C90	Elect,(CE04W1V220)	22μF,±20%,35V		
C91	Elect,(CE04W1V220)	22μF,±20%,35V		
C92	Elect,(CE04W1V220)	22μF,±20%,35V		
C93	Elect,(CE04W1V220)	22μF,±20%,35V		
C94	Elect,(CE04W1V220)	22μF,±20%,35V		
C95	Elect,(CE04W1V220)	22μF,±20%,35V		
C96	Elect,(CE04W1V220)	22μF,±20%,35V		
C97	Cer,(CK924C1H222M)	2200pF,±20%,50V		
C98	Cer,(CK924C1H222M)	2200pF,±20%,50V		
C99	Cer,(CK924C1H222M)	2200pF,±20%,50V		
C100	Cer,(CK924C1H222M)	2200pF,±20%,50V		
C101	Cer,(RPD670C472M50V)	4700pF,±20%,50V		
C102	Cer,(RPN710C223M50V)	0.022μF,±20%,50V		
C103	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C104	Cer,(RD340CK0R5CY50)	0.5pF,±0.25pF,50V		
C105	Cer,(CC924CJ1H030C)	3pF,±0.25pF,50V		
C106	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C107	Cer,(RD340CK0R5CY50)	0.5pF,±0.25pF,50V		Q'ty 0 or 1
C108	Cer,(RD340CK0R5CY50)	0.5pF,±0.25pF,50V		Q'ty 0 or 1
C109	Cer,(CC924CK1H020C)	2pF,±0.25pF,50V		
C110	Elect,(CE04W1J010)	1μF,±20%,63V		
C111	Cer,(CK924C1H222M)	2200pF,±20%,50V		
C112	Not assigned			
C113	Not assigned			
C114	Not assigned			
C115	Not assigned			
C116	Plast,(ECQ-P1 123FZ)	0.012μF,±1%,50V		
C117	Not assigned			
C118	Cer,(CC924CH1H680J)	68pF,±5%,50V		
C119	Cer,(CC924CH1H680J)	68pF,±5%,50V		
C120	Cer,(RD340CK010CY50)	1pF,±0.25pF,50V		
C121	Cer,(CK924CK1H020C)	2pF,±0.25pF,50V		
J 1	Not assigned			
J 2	Not assigned			
J 3	Connector,(PI011-02M)			
J 4	Connector,(PI011-02M)			
J 5	Receptacle,(BNC-R-NI)			
J 6	Receptacle,(BNC-R601)			
J 7	Connector, (DF1-5P2.5DSA)			

( ): Manufacturer's part number
* : Selected at factory

Table 6-2 COMPONENT LIST OF IF OSCILLATOR & AMPLIFIER (Z1)

CKT REF	DESCRIPTION	RATING		NOTE
J 8	Connector,(PI011-06M)			
J 9	Connector,(PI011-03M)			
J10	Connector,(PI011-02M)			
J11	Connector, (DF1-10P2.5DSA)	10 pins		
L 1	Microinductor, (LH1-471K)	470μH		
L 2	Coil,(442L71369A)			
L 3	Coil,(442L71369B)			
L 4	Microinductor, (LF8-221K)	220μH		
L 5	Coil,(LF8-101K)	100μH		
L 6	Coil			Pattern
L 7	Coil,(44L42744B)			
L 8	Not assigned			
L 9	Not assigned			
L10	Not assigned			
L11	Coil			Pattern
L12	Coil			Pattern
L13	Microinductor, (LH1-102K)	1mH		
L14	Coil,(442L71369A)			
L15	Coil,(442L71369C)			
L16	Microinductor, (LF8-221K)	220μH		
L17	Coil,(LF8-221K)	220μH		
L18	Coil			Pattern
L19	Coil,(44L42744B)			
L20	Microinductor, (LH1-332K)	3.3mH		
L21	Microinductor, (LH1-332K)	3.3mH		
L22	Coil,(442T46012D)			
L23	Coil,(442T46012C)			Q'ty 0 or 1
L24	Coil,(442T46012C)			
L25	Coil,(442T46014B)			
L26	Coil,(442T46012C)			
L27	Coil,(442T46014B)			
L28	Coil,(44L46022A)			
L29	Coil,(34L74409A)			
L30	Microinductor, (SP0408-R47K)	0.47μH		

( ): Manufacturer's part number
* : Selected at factory

Table 6-2 COMPONENT LIST OF IF OSCILLATOR & AMPLIFIER (Z1)

CKT REF	DESCRIPTION	RATING		NOTE
L31	Microinductor, (SP0408-R47K)	0.47μH		
L32	Coil,(44L46022B)			
L33	Microinductor, (LF8-221K)	220μH		
L34	Not assigned			
L35	Microinductor, (LF8-221K)	220μH		
L36	Microinductor, (LF8-221K)	220μH		
L37	Microinductor, (LF8-221K)	220μH		
L38	Microinductor, (LF8-470K)	47μH		
L39	Microinductor, (LF8-221K)	220μH		
L40	Microinductor, (FS0810-331K)	330μH		
L41	Microinductor, (SP0408-6R8K)	6.8μH		
L42	Coil,(LV2-681)	680μH		
Q 1	Tr,(2SC1252)			
Q 2	Di,(1S2208)			
Q 3	Di,(1S2208)			
Q 4	Di,(1SV28)			Q'ty 2 Parallel
Q 5	Not assigned			
Q 6	Tr,(2SC1252)			
Q 7	Di,(1S2208)			
Q 8	Di,(1S2208)			
Q 9	Tr,(2SC2718)			
Q10	Not assigned			
Q11	Tr,(2SC2148)			
Q12	Tr,(2SC2148)			
Q13	Di,(1S2222)			
Q14	Di,(1S2222)			
Q15	Di,(1S2222)			
Q16	Di,(1S2222)			
Q17	Di,(1S2222)			
Q18	Di,(1S2222)			
Q19	Di,(1S2222)			
Q20	Di,(1S2222)			
Q21	Tr,(2SC1251)			
Q22	Tr,(2SC1251)			
Q23	Tr,(2SC1252)			

( ): Manufacturer's part number
* : Selected at factory

Table 6-2 COMPONENT LIST OF IF OSCILLATOR & AMPLIFIER (Z1)

CKT REF	DESCRIPTION	RATING		NOTE
Q24	Tr,(2SC1251)			
Q25	Di,(1SS97)			
Q26	Di,(1SS97)			
Q27	Tr,(2SC2718)			
Q28	IC,(μPC251C)			
Q29	IC,(μPC251C)			
Q30	Not assigned			
Q31	Tr,(2SC1254)			
Q32	IC,(TC4069BP)			
Q33	IC,(74LS74A)			
Q34	Tr,(2SC1254)			
Q35	Tr,(2SC1254)			
Q36	IC,(74LS86)			
Q37	Di,breakdown,(RD11EB)	10.4 to 11.6V,400mW		
Q38	Di,breakdown,(RD9.1EB)	8.5 to 9.6V,400mW		
Q39	Tr,(2SC2148)			
R 1	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R 2	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R 3	CF,(ARD25T330J)	33Ω,±5%,1/4W		
R 4	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R 5	MF,(NRTF1/4C * J)	10 to 68Ω,±5%,1/4W		Q'ty 0 or 1, *
R 6	MF,(NRTF1/4C 220ΩJ)	220Ω,±5%,1/4W		
R 7	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R 8	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R 9	CF,(ARD25T330J)	33Ω,±5%,1/4W		
R10	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R11	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R12	CF,(ARD25T682J)	6.8kΩ,±5%,1/4W		
R13	Var,MF,(RJ-6P 10kΩ)	10kΩ,1/2W		
R14	CF,(ARD25T * J)	100Ω to 3.3kΩ,±5%, 1/4W		Q'ty 0 or 1, *
R15	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R16	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R17	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R18	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R19	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R20	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R21	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R22	CF,(ARD25T * J)	22 to 220Ω,±5%,1/4W		Q'ty 0 or 1, *
R23	Var,MF,(RJ-6P 500Ω)	500Ω,1/2W		
R24	MF,(NRN1/4C4 150ΩD)	150Ω,±0.5%,1/4W		Q'ty 0 or 1, *

( ): Manufacturer's part number

* : Selected at factory

Table 6-2 COMPONENT LIST OF IF OSCILLATOR & AMPLIFIER (Z1)

CKT REF	DESCRIPTION	RATING		NOTE
R25	MF,(NRN1/4C4 50ΩD)	50Ω,±0.5%,1/4W		
R26	CF,(ARD25T122J)	1.2kΩ,±5%,1/4W		
R27	MF,(NRN1/4C4 292ΩD)	292Ω,±0.5%,1/4W		
R28	CF,(ARD25T122J)	1.2kΩ,±5%,1/4W		
R29	CF,(ARD25T391J)	390Ω,±5%,1/4W		
R30	MF,(NRTF1/4C 470ΩJ)	470Ω,±5%,1/4W		
R31	MF,(NRN1/4C4 71.2ΩD)	71.2Ω,±0.5%,1/4W		
R32	CF,(ARD25T181J)	180Ω,±5%,1/4W		
R33	MF,(NRN1/4C4 332ΩD)	332Ω,±0.5%,1/4W		
R34	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R35	CF,(ARD25T121J)	120Ω,±5%,1/4W		
R36	MF,(NRTF1/4C 330ΩJ)	330Ω,±5%,1/4W		
R37	MF,(RN14K2E12R7D)	12.7Ω,±0.5%,1/4W		
R38	MF,(RN14K2E4220D)	422Ω,±0.5%,1/4W		
R39	MF,(RN14K2E4220D)	422Ω,±0.5%,1/4W		
R40	MF,(RN14K2E12R7D)	12.7Ω,±0.5%,1/4W		
R41	MF,(RN14K2E21R0D)	21.0Ω,±0.5%,1/4W		
R42	MF,(RN14K2E2490D	249Ω,±0.5%,1/4W		
R43	MF,(RN14K2E2490D)	249Ω,±0.5%,1/4W		
R44	MF,(RN14K2E21R0D)	21.0Ω,±0.5%,1/4W		
R45	MF,(NRTF1/4C 100ΩJ)	100Ω,±5%,1/4W		
R46	CF,(ARD25T122J)	1.2kΩ,±5%,1/4W		
R47	MF,(NRTF1/4C 220ΩJ)	220Ω,±5%,1/4W		
R48	CF,(ARD25T561J)	560Ω,±5%,1/4W		
R49	MF,(NRTF1/4C 33ΩJ)	33Ω,±5%,1/4W		
R50	MF,(NRN1/4C4 35.7ΩD)	35.7Ω,±0.5%,1/4W		
R51	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R52	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R53	Var,MF,(RJ-6P 200Ω)	200Ω,1/2W		
R54	MF,(NRTF1/4C 150ΩJ)	150Ω,±5%,1/4W		
R55	MF,(NRN1/4C4 11.5ΩD)	11.5Ω,±0.5%,1/4W		
R56	CF,(ARD25T100J)	10Ω,±5%,1/4W		
R57	MF,(NRN1/4C4 11.5ΩD)	11.5Ω,±0.5%,1/4W		
R58	MF,(RN14K2H101J)	100Ω,±5%,1/2W		
R59	MF,(NRN1/4C4 35.7ΩD)	35.7Ω,±0.5%,1/4W		
R60	CF,(ARD25T560J)	56Ω,±5%,1/4W		
R61	MF,(NRN1/4C4 75ΩD)	75Ω,±0.5%,1/4W		
R62	MF,(NRN1/4C4 26.7ΩD)	26.7Ω,±0.5%,1/4W		
R63	CF,(ARD25T181J)	180Ω,±5%,1/4W		
R64	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R65	CF,(ARD25T182J)	1.8kΩ,±5%,1/4W		
R66	MF,(NRN1/4C4 75ΩD)	75Ω,±0.5%,1/4W		
R67	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R68	CF,(ARD25T301J)	300Ω,±5%,1/4W		
R69	MF,(NRN1/4C4 107ΩD)	107Ω,±0.5%,1/4W		
R70	MF,(NRN1/4C4 204ΩD)	204Ω,±0.5%,1/4W		

( ): Manufacturer's part number

* : Selected at factory

Table 6-2 COMPONENT LIST OF IF OSCILLATOR & AMPLIFIER (Z1)

CKT REF	DESCRIPTION	RATING		NOTE
R71	MF,(NRN1/4C4 75ΩD)	75Ω,±0.5%,1/4W		
R72	MF,(NRTF1/4C 100ΩJ)	100Ω,±5%,1/4W		
R73	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R74	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R75	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R76	CF,(ARD25T121J)	120Ω,±5%,1/4W		
R77	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R78	CF,(ARD25T334J)	330kΩ,±5%,1/4W		
R79	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R80	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R81	CF,(ARD25R822J)	8.2kΩ,±5%,1/4W		
R82	CF,(ARD25T333J)	33kΩ,±5%,1/4W		
R83	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R84	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R85	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R86	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R87	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R88	CF,(ARD25T121J)	120Ω,±5%,1/4W		
R89	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R90	Var,MF,(RJ-6P 100kΩ)	100kΩ,1/2W		
R91	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R92	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R93	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R94	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R95	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R96	Not assigned			
R97	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R98	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R99	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R100	CF,(ARD25T561J)	560Ω,±5%,1/4W		
R101	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R102	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R103	Var,MF,(RJ-6P 10kΩ)	10kΩ,1/2W		
R104	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R105	MF,(NRN1/4C4 332ΩD)	332Ω,±0.5%,1/4W		
R106	MF,(NRN1/4C4 35.7ΩD)	35.7Ω,±0.5%,1/4W		
R107	MF,(NRN1/4C4 332ΩD)	332Ω,±0.5%,1/4W		
R108	MF,(NRN1/4C4 71.2ΩD)	71.2Ω,±0.5%,1/4W		
R109	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R110	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R111	CF,(ARD25T272J)	2.7kΩ,±5%,1/4W		
R112	MF,(NRN1/4C4 332ΩD)	332Ω,±0.5%,1/4W		
R113	MF,(NRTF1/4C 330ΩJ)	330Ω,±5%,1/4W		
R114	Var,MF,(RJ-6P 1kΩ)	1kΩ,1/2W		
R115	Not assigned			
R116	Not assigned			

( ): Manufacturer's part number

* : Selected at factory

Table 6-2 COMPONENT LIST OF IF OSCILLATOR & AMPLIFIER (Z1)

CKT REF	DESCRIPTION	RATING		NOTE
R117	Not assigned			
R118	Not assigned			
R119	Not assigned			
R120	MF,(NRTF1/4C 150ΩJ)	150Ω,±5%,1/4W		
R121	Not assigned			
R122	Not assigned			
R123	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R124	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R125	MF,(NRTF1/4C 150ΩJ)	150Ω,±5%,1/4W		
X 1	XTAL OSC,(44x71356A)	802kHz		K type
	XTAL OSC,(44x71356B)	1113.1kHz		L type
	XTAL OSC,(44x71356C)	1002kHz		M type
Z 1	L.P.F.,(1 GHz)			Pattern
Z 2	DBM,(M6)			

( ): Manufacturer's part number

* : Selected at factory

Table 6-4 COMPONENT LIST OF SWEEP OSCILLATOR & BB AMPLIFIER (Z3)

CKT REF	DESCRIPTION	RATING		NOTE
L 5	Microinductor, (LS8-221K)			
L 6	Microinductor, (LF8-221K)			
L 7	Microinductor, (LF8-470K)			
L 8	Microinductor, (LF8-221K)			
L 9	Microinductor, (SP0408-R47K)	0.47μH		
Q 1	FET,(3SK28)			
Q 2	Tr,(2SC1254)			
Q 3	Tr,(2SC1254)			
Q 4	Not assigned			
Q 5	Di,breakdown,(RD11EB)	10.4 to 11.6V,400mW		
Q 6	Not assigned			
Q 7	Tr,(2SC1254)			
Q 8	Tr,(2SC1252)			
Q 9	Di,(1SS97)			
Q10	Di,(1SS97)			
Q11	IC,(μPC251C)			
Q12	IC,(μPC251C)			
Q13	IC,(μPC251C)			
Q14	IC,(μPA39A)			
Q15	IC,(TC4053BP)			
Q16	Di,breakdown,(RD3.9EB)	3.7 to 4.1V,400mW		
Q17	IC,(μPC14308H)			
Q18	Not assigned			
Q19	Di,breakdown,(RD3.9EB)	3.7 to 4.1V,400mW		
Q20	Di,breakdown,(RD3.9EB)	3.7 to 4.1V,400mW		
Q21	FET,(2SK55E)			
Q22	Di,(1S953)			
Q23	Di,breakdown,(RD3.9EB)	3.7 to 4.1V,400mW		
Q24	Di,breakdown,(RD3.9EB)	3.7 to 4.1V,400mW		
Q25	IC,(μPC151C)			
Q26	FET,(2SK55E)			
Q27	Di,(1S953)			
Q28	Tr,(2SC2718)			
Q29	IC,(μPC251C)			
Q30	Tr,(2SC2718)			
Q31	FET,(2SK55E)			
Q32	Di,(1S953)			
Q33	Di,breakdown,(RD3.9EB)	3.7 to 4.1V,400mW		
Q34	Di,breakdown,(RD3.9EB)	3.7 to 4.1V,400mW		
Q35	IC,(μPC151C)			

( ): Manufacturer's part number
* : Selected at factory

Table 6-4 COMPONENT LIST OF SWEEP OSCILLATOR & BB AMPLIFIER (Z3)

CKT REF	DESCRIPTION	RATING		NOTE
Q36	FET,(2SK55E)			
Q37	Di,(1S953)			
Q38	IC,(μPC251C)			
Q39	IC,(μPC251C)			
Q40	Photo coupler, (P873A-G35-380)			
Q41	IC,(μPC251C)			
Q42	Di,(1S953)			
Q43	Di,(1S953)			
Q44	Di,(1S953)			
Q45	Tr,(2SC2718)			
Q46	IC,(74LS290)			
Q47	IC,(μPC251C)			
Q48	IC,(μPC154A)			
Q49	Tr,(2SC2718)			
Q50	Di,(1S953)			
Q51	Di,(1S953)			
Q52	Tr,(2SC1008)			
Q53	Tr,(2SA708)			
Q54	IC,(μPC251C)			
Q55	Di,(1S953)			
Q56	Di,(1S953)			
Q57	Di,breakdown,(02BZ2.2)	1.88 to 2.56V,250mW		
Q58	IC,(TC4053BP)			
Q59	IC,(μPC151C)			
Q60	Di,(1S953)			
Q61	IC,(74LS14)			
Q62	Not assigned			
Q63	Not assigned			
Q64	Di,(1S953)			
Q65	Di,(1S953)			
Q66	Di,(1S953)			
Q67	Di,(1S953)			
Q68	Di,(1S953)			
Q69	IC,(μPC151C)			
R 1	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R 2	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R 3	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R 4	CF,(ARD25T121J)	120Ω,±5%,1/4W		
R 5	CF,(ARD25T100J)	10Ω,±5%,1/4W		
R 6	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R 7	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R 8	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R 9	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R10	CF,(ARD25T101J)	100Ω,±5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-4 COMPONENT LIST OF SWEEP OSCILLATOR & BB AMPLIFIER (Z3)

CKT REF	DESCRIPTION	RATING		NOTE
R11	MF,(RN14K2H681J)	680Ω,±5%,1/2W		
R12	Not assigned			
R13	Not assigned			
R14	Not assigned			
R15	Not assigned			
R16	CF,(ARD25T150J)	15Ω,±5%,1/4W		
R17	CF,(ARD25T182J)	1.8kΩ,±5%,1/4W		
R18	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R19	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R20	CF,(ARD25T * J)	3.3k to 100kΩ,±5%, 1/4W		Q'ty 1 or 2, *
R21	Not assigned			
R22	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R23	MF,(RN14K2H471J)	470Ω,±5%,1/2W		
R24	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R25	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R26	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R27	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R28	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R29	Var,MF,(RJ-6P 100Ω)	100Ω,1/2W		
R30	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R31	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R32	CF,(ARD25T473J)	47kΩ,±5%,1/4W		
R33	CF,(ARD25T122J)	1.2kΩ,±5%,1/4W		
R34	CF,(ARD25T224J)	220kΩ,±5%,1/4W		
R35	Not assigned			
R36	CF,(ARD25T333J)	33kΩ,±5%,1/4W		
R37	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R38	CF,(ARD25T153J)	15kΩ,±5%,1/4W		
R39	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R40	Var,MF,(RJ-6S 10kΩ)	10kΩ,1/2W		
R41	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R42	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R43	CF,(ARD25T153J)	15kΩ,±5%,1/4W		
R44	MF,(RN14K2E2211D)	2.21kΩ,±0.5%,1/4W		
R45	Var,MF,(RJ-6S 500kΩ)	500kΩ,1/2W		
R46	MF,(RN14K2E9311D)	9.31kΩ,±0.5%,1/4W		
R47	Var,WW,(442R42845)	60Ω,2mW		
R48	CF,(ARD25T6R8J)	6.8Ω,±5%,1/4W		
R49	MF,(RN14K2E7680D)	768Ω,±0.5%,1.4W		
R50	Var,MF,(RJ-6S 2kΩ)	2kΩ,1/2W		
R51	Var,MF,(RJ-6S 50kΩ)	50kΩ,1/2W		
R52	Var,MF,(RJ-6S 100kΩ)	100kΩ,1/2W		
R53	CF,(ARD25T333J)	33kΩ,±5%,1/4W		
R54	Not assigned			
R55	CF,(ARD25T103J)	10kΩ,±5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-4 COMPONENT LIST OF SWEEP OSCILLATOR & BB AMPLIFIER (Z3)

CKT REF	DESCRIPTION	RATING		NOTE
R56	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R57	CF,(ARD25T224J)	220kΩ,±5%,1/4W		
R58	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R59	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R60	CF,(ARD25T * J)	2.2k to 4.7kΩ,±5%, 1/4W		*
R61	CF,(ARD25T913J)	91kΩ,±5%,1/4W		
R62	Var,MF,(RJ-6P 20kΩ)	20kΩ,1/2W		
R63	CF,(ARD25T683J)	68kΩ,±5%,1/4W		
R64	CF,(ARD25T220J)	22Ω,±5%,1/4W		
R65	CF,(ARD25T273J)	27kΩ,±5%,1/4W		
R66	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R67	CF,(ARD25T272J)	2.7kΩ,±5%,1/4W		
R68	CF,(ARD25T224J)	220kΩ,±5%,1/4W		
R69	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R70	CF,(ARD25T334J)	330kΩ,±5%,1/4W		
R71	CF,(ARD25T751J)	750Ω,±5%,1/4W		
R72	CF,(ARD25T * J)	100Ω to 1.5kΩ,±5%, 1/4W		Q'ty 0 or 1, *
R73	CF,(ARD25T751J)	750Ω,±5%,1/4W		
R74	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R75	CF,(ARD25T684J)	680kΩ,±5%,1/4W		
R76				
R76	CF,(ARD25T * J)	75k to 150kΩ,±5%, 1/4W		*
R77	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R78	CF,(ARD25T * J)	100Ω to 1.5kΩ,±5%, 1/4W		Q'ty 0 or 1, *
R79	MF,(RN14K2E4220D)	422Ω,±0.5%,1/4W		
R80	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R81	CF,(ARD25T474J)	470kΩ,±5%,1/4W		
R82	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R83	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R84	CF,(ARD25T822J)	8.2kΩ,±5%,1/4W		
R85	CF,(ARD25T224J)	220kΩ,±5%,1/4W		
R86	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R87	CF,(ARD25T * J)	100k to 1MΩ,±5%, 1/4W		Q'ty 0 or 1, *
R88	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R89	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R90	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R91	CF,(ARD25T * J)	56k to 100kΩ,±5%, 1/4W		*
R92	CF,(ARD25T * J)	1k to 33kΩ,±5%,1/4W		*
R93	CF,(ARD25T * J)	56k to 100kΩ,±5%, 1/4W		*
R94	Var,MF,(RJ-6S 20kΩ)	20kΩ,1/2W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-4 COMPONENT LIST OF SWEEP OSCILLATOR & BB AMPLIFIER (Z3)

CKT REF	DESCRIPTION	RATING		NOTE
R95	CF,(ARD25T683J)	68kΩ,±5%,1/4W		
R96	CF,(ARD25T220J)	22Ω,±5%,1/4W		
R97	CF,(ARD25T273J)	27kΩ,±5%,1/4W		
R98	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R99	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R100	CF,(ARD25T224J)	220kΩ,±5%,1/4W		
R101	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R102	CF,(ARD25T154J)	150kΩ,±5%,1/4W		
R103	CF,(ARD25T * J)	1k to 27kΩ,±5%,1/4W		*
R104	CF,(ARD25T * J)	100Ω to 3.9kΩ,±5%, 1/4W		Q'ty 0 or 1, *
R105	CF,(ARD25T334J)	330kΩ,±5%,1/4W		
R106	CF,(ARD25T154J)	150kΩ,±5%,1/4W		
R107	CF,(ARD25T * J)	1k to 33kΩ,±5%,1/4W		*
R108	CF,(ARD25T * J)	100Ω to 8.2kΩ,±5%, 1/4W		*
R109	CF,(ARD25T224J)	220kΩ,±5%,1/4W		Q'ty 0 or 1,*
R110	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R111	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R112	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R113	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R114	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R115	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R116	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R117	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R118	Var,MF,(RJ-6S 500Ω)	500Ω,1/2W		
R119	CF,(ARD25T562J)	5.6kΩ,±5%,1/4W		
R120	CF,(ARD25T333J)	33kΩ,±5%,1/4W		
R121	CF,(ARD25T333J)	33kΩ,±5%,1/4W		
R122	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R123	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R124	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R125	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R126	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R127	CF,(ARD25T220J)	22Ω,±5%,1/4W		
R128	Not assigned			
R129	CF,(ARD25T273J)	27kΩ,±5%,1/4W		
R130	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R131	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R132	Var,MF,(RJ-6P 20kΩ)	20kΩ,1/2W		
R133	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R134	CF,(ARD25T560J)	56Ω,±5%,1/4W		
R135	CF,(ARD25T560J)	56Ω,±5%,1/4W		
R136	Var,MF,(RJ-6S 1kΩ)	1kΩ,1/2W		
R137	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R138	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R139	CF,(ARD25T103J)	10kΩ,±5%,1/4W		

( ): Manufacturer's part number

* : Selected at factory

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Table 6-4 COMPONENT LIST OF SWEEP OSCILLATOR & BB AMPLIFIER (Z3)

CKT REF	DESCRIPTION	RATING		NOTE
R140	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R141	CF,(ARD25T473J)	47kΩ,±5%,1/4W		
R142	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R143	CF,(ARD25T822J)	8.2kΩ,±5%,1/4W		
R144	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R145	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R146	Var,MF,(RJ-6S 1kΩ)	1kΩ,1/2W		
R147	CF,(ARD25T103J) Ω	10kΩ,±5%,1/4W		
R148	Var,MF,(RJ-6S 50kΩ)	50kΩ,1/2W		
R149	Var,MF,(RJ-6S 100kΩ)	100kΩ,1/2W		
R150	CF,(ARD25T561J)	560Ω,±5%,1/4W		
R151	CF,(ARD25T271J)	270Ω,±5%,1/4W		
R152	CF,(ARD25T270J)	27Ω,±5%,1/4W		
R153	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R154	Var,MF,(RJ-6S 10kΩ)	10kΩ,1/2W		
R155	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R156	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R257	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R158	CF,(ARD25T * J)	470Ω to 1kΩ,±5%,1/4W		*
R159	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R160	CF,(ARD25T392J)	3.9kΩ,±5%,1/4W		
R161	Var,MF,(RJ-6P 2kΩ)	2kΩ,1/2W		
R162	Not assigned			
R163	Not assigned			
R164	Not assigned			
R165	Not assigned			
R166	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R167	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R168	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R169	CF,(ARD25T124J)	120kΩ,±5%,1/4W		
R170	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R171	CF,(ARD25T123J)	12kΩ,±5%,1/4W		
R172	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R173	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R174	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R175	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R176	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R177	CF,(ARD25T101J)	100Ω,±5%,1/4W		

( ): Manufacturer's part number

* : Selected at factory

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Table 6-5 COMPONENT LIST OF BB OSCILLATOR (Z4)

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer,(CC924CH1H080D)	8pF,±0.5pF,50V		Parallel
	Cer,(CC924CH1H330J)	33pF,±5%,50V		
C 2	Var,Cer,(TZ03T110A)	11pF,100V		
C 3	Cer,(CC924CH1H221J)	220pF,±5%,50V		
C 4	Cer,(CC924CH1H221J)	220pF,±5%,50V		
C 5	Cer,(CC924CH1H221J)	220pF,±5%,50V		
C 6	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		
C 7	Plast,(ECQ-M1H102KZ)	1000pF,±10%,50V		
C 8	Not assigned			
C 9	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V		
C10	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V		
C11	Cer,(CC924CH1H330J)	33pF,±5%,50V		
C12	Var,Cer,(TZ03T110A)	11pF,100V		
C13	Cer,(CC924CH1H331J)	330pF,±5%,50V		
C14	Cer,(CC924CH1H331J)	330pF,±5%,50V		
C15	Cer,(CC924CH1H331J)	330pF,±5%,50V		
C16	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		
C17	Plast,(ECQ-M1H222KZ)	2200pF,±10%,50V		
C18	Not assigned			
C19	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V		
C20	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V		
C21	Cer,(CC924CH1H330J)	33pF,±5%,50V		
C22	Var,Cer,(TZ03T110A)	11pF,100V		
C23	Cer,(CC924CH1H471J)	470pF,±5%,50V		
C24	Cer,(CC924CH1H471J)	470pF,±5%,50V		
C25	Cer,(CC924CH1H471J)	470pF,±5%,50V		
C26	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		
C27	Plast,(ECQ-M1H222KZ)	2200pF,±10%,50V		
C28	Cer,(CC924CH1H471J)	470pF,±5%,50V		
C29	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V		
C30	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V		
C31	Cer,(CC924CH1H330J)	33pF,±5%,50V		
C32	Var,Cer,(TZ03T110A)	11pF,100V		
C33	Cer,(CC924CH1H471J)	470pF,±5%,50V		
C34	Cer,(CC924CH1H471J)	470pF,±5%,50V		
C35	Cer,(CC924CH1H471J)	470pF,±5%,50V		
C36	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		
C37	Plast,(ECQ-M1H332KZ)	3300pF,±10%,50V		
C38	Plast,(ECQ-M1H102KZ)	1000pF,±10%,50V		
C39	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V		
C40	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V		
C41	Cer,(CC924CH1H330J)	33pF,±5%,50V		
C42	Var,Cer,(TZ03T110A)	11pF,100V		
C43	Cer,(CC924CH1H471J)	470pF,±5%,50V		
C44	Cer,(CC924CH1H471J)	470pF,±5%,50V		
C45	Cer,(CC924CH1H471J)	470pF,±5%,50V		

( ): Manufacturer's part number

* : Selected at factory

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Table 6-5 COMPONENT LIST OF BB OSCILLATOR (Z4)

CKT REF	DESCRIPTION	RATING		NOTE
C46	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		
C47	Plast,(ECQ-M1H222KZ)	2200pF,±10%,50V		
C48	Not assigned			
C49	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V		
C50	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V		
C51	Cer,(CC924CH1H220J)	22pF,±5%,50V		
C52	Var,Cer,(TZ03T110A)	11pF,100V		
C53	Plast,(ECQ-M1H102KZ)	1000pF,±10%,50V		
C54	Cer,(CC924CH1H331J)	330pF,±5%,50V		Parallel
	Cer,(CC924CH1H471J)	470pF,±5%,50V		
C55	Cer,(CC924CH1H331J)	330pF,±5%,50V		Parallel
	Cer,(CC924CH1H471J)	470pF,±5%,50V		
C56	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		
C57	Plast,(ECQ-M1H332KZ)	3300pF,±10%,50V		
C58	Plast,(ECQ-M1H332KZ)	3300pF,±10%,50V		Q'ty 0 or 1,*
C59	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V		
C60	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V		
C61	Cer,(CC924CH1H470J)	47pF,±5%,50V		
C62	Var,Cer,(TZ03T110A)	11pF,100V		
C63	Cer,(CC924CH1H221J)	220pF,±5%,50V		
C64	Cer,(CC924CH1H221J)	220pF,±5%,50V		
C65	Cer,(CC924CH1H221J)	220pF,±5%,50V		
C66	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V		
C67	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V		
C68	Elect,(CE04W1V220)	22μF,±20%,35V		
C69	Elect,(CE04W1V220)	22μF,±20%,35V		
C70	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V		K type
	Plast,(ECQ-M1H223KZ)	0.022μF,±10%,50V		L type
	Plast,(ECQ-M1H223KZ)	0.022μF,±20%,50V		M type
C71	Plast,(ECQ-M1H102KZ)	1000pF,±10%,50V		K type
	Plast,(ECQ-M1H222KZ)	2200pF,±10%,50V		L type
	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V		M type
C72	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V		K type
	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		L type
	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		M type
C73	Plast,(ECQ-M1H332KZ)	3300pF,±10%,50V		K type
	Plast,(ECQ-M1H222KZ)	2200pF,±10%,50V		L type
	Plast,(ECQ-P1 392FZ)	3900pF,±1%,100V		M type
				Q'ty 0 or 1
C74	Plast,(ECQ-M1H223KZ)	0.022μF,±10%,50V		K type
	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V		L type
	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V		M type
C75	Plast,(ECQ-M1H332KZ)	3300pF,±10%,50V		K type
	Plast,(ECQ-M1H332KZ)	3300pF,±10%,50V		L type
	Plast,(ECQ-P1 682FZ)	6800pF,±1%,100V		M type

( ): Manufacturer's part number

* : Selected at factory

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Table 6-5 COMPONENT LIST OF BB OSCILLATOR (Z4)

CKT REF	DESCRIPTION	RATING		NOTE
C76	Elect,(CE04W1V220)	22μF,±20%,35V		
C77	Elect,(CE04W1V220)	22μF,±20%,35V		
C78	Plast,(ECQ-M1H104KZ)	0.1μF,±10%,50V		
C79	Plast,(ECQ-M1H223KZ)	0.022μF,±10%,50V		
C80	Plast,(ECQ-M1H223KZ)	0.022μF,±10%,50V		
C81	Plast,(ECQ-M1H223KZ)	0.022μF,±10%,50V		
C82	Plast,(ECQ-M1H223KZ)	0.022μF,±10%,50V		
C83	Plast,(ECQ-M1H223KZ)	0.022μF,±10%,50V		
C84	Plast,(ECQ-M1H223KZ)	0.022μF,±10%,50V		
C85	Elect,(CE04W1V220)	22μF,±20%,35V		
C86	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		
C87	Elect,(CE04W1V220)	22μF,±20%,35V		
C88	Elect,(CE04W1J010)	1μF,±20%,63V		
C89	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V		
C90	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V		
C91	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V		
C92	Elect,(CE04W1V220)	22μF,±20%,35V		
C93	Plast,(ECQ-M1H223KZ)	0.022μF,±10%,50V		
C94	Elect,(CE04W1V220)	22μF,±20%,35V		
C95	Plast,(ECQ-M1H223KZ)	0.022μF,±10%,50V		
C96	Elect,(CE04W1V220)	22μF,±20%,35V		
C97	Plast,(ECQ-M1H223KZ)	0.022μF,±10%,50V		
C98	Plast,(ECQ-M1H223KZ)	0.022μF,±10%,50V		K type
	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V		L type
	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V		M type
C99	Elect,(CE04W1A101)	100μF,±20%,10V		
C100	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V		K type
	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		L type
	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		M type
C101	Elect,(CE04W1J010)	1μF,±20%,63V		
C102	Elect,(CE04W1J010)	1μF,±20%,63V		
C103	Cer,(CC924CH1H050D)	5pF,±0.5pF,50V		
C104	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V		
C105	Plast,(ECQ-P1 332FZ)	3300pF,±1%,100V		K type
	Plast,(ECQ-P1 222FZ)	2200pF,±1%,100V		L type
	Plast,(ECQ-P1 392FZ)	3900pF,±1%,100V		M type
C106	Plast,(ECQ-P1 332FZ)	3300pF,±1%,100V		K type
	Plast,(ECQ-P1 332FZ)	3300pF,±1%,100V		L type
	Plast,(ECQ-P1 682FZ)	6800pF,±1%,100V		M type
C107	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V		
C108	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V		
C109	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V		
C110	Cer,(CK924C1H104M)	0.1μF,±20%,50V		

( ): Manufacturer's part number
* : Selected at factory

Table 6-5 COMPONENT LIST OF BB OSCILLATOR (Z4)

CKT REF	DESCRIPTION	RATING		NOTE
J 1	Connector,(PI021-2M)			
J 2	Receptacle,(27DP-BR)			
J 3	Pattern			
L 1	Coil,(10K17-65T)			
L 2	Coil,(10K17-65T)			
L 3	Coil,(10K17-85T)			
L 4	Coil,(10K17-85T)			
L 5	Coil,(LV1-010)			
L 6	Coil,(LV1-1R5)			
L 7	Not assigned			
L 8	Coil,(LV1-3R3)			
L 9	Coil,(LV1-470)			
L10	Coil,(LV1-221)			
L11	Coil,(LF8-221K)	220μH		
L12	Coil,(LF8-221K)	220μH		
L13	Coil,(LF8-221K)	220μH		
L14	Coil,(LF8-221K)	220μH		
L15	Coil,(LF8-221K)	220μH		
L16	Coil,(LV2-681)	680μH		
L17	Not assigned			
L18	Coil,(LV1-470)			
L19	Coil,(LV1-221)			
L20	Coil,(LV2-681)			
Q 1 to Q21	Tr,(2SC1718)			ME538K/L/M
Q22	IC,(74LS293)			K type
Q23	IC,(74LS290)			K type
Q24	IC,(74LS74A)			
Q25	IC,(74LS290)			L type
Q26	IC,(74LS290)			M type
Q27	IC,(74LS02)			
Q28	IC,(74LS74A)			
Q29	IC,(74LS74A)			
Q30	IC,(74LS293)			
Q31	Tr,(2SC2718)			
Q32	Tr,(2SC2718)			
Q33	Tr,(2SC2718)			
Q34	Tr,(2SC2718)			
Q35	Tr,(2SC2718)			
Q36	IC,(μPA67C)			
Q37	IC,(7406)			
Q38	IC,(μPC78L05)			

( ): Manufacturer's part number
* : Selected at factory

Table 6-5 COMPONENT LIST OF BB OSCILLATOR (Z4)

CKT REF	DESCRIPTION	RATING		NOTE
Q39	IC,(μPC78L12)			
Q40	IC,(74LS290)			
Q41	IC,(74LS293)			
Q42	IC,(74LS74A)			
Q43	Tr,(2SC2718)			
Q44	Tr,(2SC2718)			
Q45	Tr,(2SC2718)			
Q46	Tr,(2SC2718)			
Q47	Tr,(2SA1151)			
R 1	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R 2	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R 3	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R 4	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R 5	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R 6	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R 7	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R 8	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R 9	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R10	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R11	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R12	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R13	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R14	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R15	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R16	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R17	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R18	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R19	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R20	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R21	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R22	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R23	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R24	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R25	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R26	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R27	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R28	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R29	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R30	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R31	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R32	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R33	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R34	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R35	CF,(ARD25T103J)	10kΩ,±5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-5 COMPONENT LIST OF BB OSCILLATOR (Z4)

CKT REF	DESCRIPTION	RATING		NOTE
R36	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R37	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R38	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R39	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R40	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R41	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R42	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R43	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R44	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R45	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R46	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R47	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R48	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R49	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R50	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R51	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R52	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R53	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R54	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R55	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R56	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R57	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R58	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R59	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R60	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R61	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R62	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R63	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R64	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R65	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R66	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R67	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R68	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R69	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R70	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R71	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R72	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R73	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R74	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R75	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R76	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R77	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R78	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R79	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R80	CF,(ARD25T683J)	68kΩ,±5%,1/4W		
R81	CF,(ARD25T103J)	10kΩ,±5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-5 COMPONENT LIST OF BB OSCILLATOR (Z4)

CKT REF	DESCRIPTION	RATING		NOTE
R82	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R83	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R84	Not assigned			
R85	CF,(ARD25T * J)	2.2k to 4.7kΩ,±5%, 1/4W		K/M:3.9kΩ L :3.3kΩ
R86	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R87	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R88	Var,MF,(RJ-6P 2kΩ)	2kΩ,1/2W		
R89	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R90	Var,MF,(RJ-6P 2kΩ)	2kΩ,1/2W		
R91	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R92	Var,MF,(RJ-6P 2kΩ)	2kΩ,1/2W		
R93	Var,MF,(RJ-6S 5kΩ)	5kΩ,1/2W		
R94	Var,MF,(RJ-6S 5kΩ)	5kΩ,1/2W		
R95	Var,MF,(RJ-6S 5kΩ)	5kΩ,1/2W		
R96	Var,MF,(RJ-6S 5kΩ)	5kΩ,1/2W		
R97	Var,MF,(RJ-6S 5kΩ)	5kΩ,1/2W		
R98	Var,MF,(RJ-6S 5kΩ)	5kΩ,1/2W		
R99	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R100	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R101	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R102	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R103	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R104	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R105	CF,(ARD25T392J)	3.9kΩ,±5%,1/4W		K/M:3.9kΩ L :3.3kΩ
R106	Single in-line array, (IHR-6-103JA)	10kΩ x 6,1/8W		
R107	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R108	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R109	CF,(ARD25T820J)	82Ω,±5%,1/4W		
R110	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R111	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R112	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R113	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R114	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R115	Var,MF,(RJ-6P 2kΩ)	2kΩ,1/2W		
R116	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R117	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R118	Not assigned			
R119	Not assigned			
R120	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R121	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R122	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R123	CF,(ARD25T103J)	10kΩ,±5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-5 COMPONENT LIST OF BB OSCILLATOR (Z4)

CKT REF	DESCRIPTION	RATING		NOTE
R124	Not assigned			
R125	Not assigned			
R126	Not assigned			
R127	Not assigned			
R128	Not assigned			
R129	Not assigned			
R130	Not assigned			
R131	Not assigned			
R132	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
X 1	XTAL OSC,(44x68901G)	12.39MHz		ME538「」
X 2	XTAL OSC,(44x68901F)	8.2MHz		
X 3	XTAL OSC,(44x68901E)	5.6MHz		
X 4	XTAL OSC,(44x68901D)	4.43MHz		
X 5	XTAL OSC,(44x68901C)	3.58MHz		
X 6	XTAL OSC,(44x68901A)	2MHz		K type
	XTAL OSC,(44x68901B)	2.4MHz		L/M type
X 7	Not assigned			
X 8	XTAL OSC,(44x68901H)	20MHz		

( ): Manufacturer's part number
* : Selected at factory

Table 6-6 COMPONENT LIST OF CRYSTAL OSCILLATOR & BB.SWEEPER (Z5)

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Plast,(ECQ-M1H 222KZ)	2200pF,±10%,50V		
C 2	Cer,(CC924CH1H150J)	15pF,±5%,50V		
C 3	Cer,(CC924CH1H100D)	10pF,±0.5pF,50V		
C 4	Cer,(CC924CH1H150J)	15pF,±5%,50V		
C 5	Cer,(CC924CH1H101J)	100pF,±5%,50V		
C 6	Plast,(ECQ-M1H 222KZ)	2200pF,±10%,50V		ME538A/B/C
C 7	Cer,(CC924CH1H070D)	7pF,±0.5pF,50V		
C 8	Cer,(CC924CH1H050D)	5pF,±0.5pF,50V		
C 9	Cer,(CC924CH1H150J)	15pF,±5%,50V		
C 10	Cer,(CC924CH1H101J)	100pF,±5%,50V		
C 11	Cer,(CK924C1H222M)	2200pF,±20%,50V		
C 12	Cer,(CK924C1H222M)	2200pF,±20%,50V		
C 13	Cer,(CK924C1H222M)	2200pF,±20%,50V		
C 14	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C 15	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C 16	Cer,(CK924C1H222M)	2200pF,±20%,50V		
C 17	Cer,(CK924C1H222M)	2200pF,±20%,50V		
C 18	Plast,(ECQ-M1H 104KZ)	0.1μF,±10%,50V		
C 19	Plast,(ECQ-M1H 103KZ)	0.01μF,±10%,50V		
C 20	Plast,(ECQ-M1H 103KZ)	0.01μF,±10%,50V		
C 21	Cer,(CC924CH1H101J)	100pF,±5%,50V		
C 22	Cer,(CC924CH1H101J)	100pF,±5%,50V		
C 23	Cer,(CC924CH1H100D)	10pF,±0.5pF,50V		
C 24	Cer,(CC924CH1H100D)	10pF,±0.5pF,50V		
C 25	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C 26	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C 27	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C 28	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C 29	Cer,(CC924CH1H470J)	47pF,±5%,50V		
	Cer,(RD340CH010CY50)	1pF,±0.25pF,50V		
C 30	Cer,(CC924CH1H090D)	9pF,±0.5pF,50V		
	Cer,(RD340CH0R5CY50)	0.5pF,±0.5pF,50V		
C 31	Cer,(CC924CH1H101J)	100pF,±5%,50V		
	Cer,(CC924CH1H050D)	5pF,±0.5pF,50V		
C 32	Cer,(CC924CH1H220J)	22pF,±5%,50V		
	Cer,(CC924CH1H070D)	7pF,±0.5pF,50V		
C 33	Cer,(CC924CH1H330J)	33pF,±5%,50V		
	Cer,(CC924CH1H100D)	10pF,±0.5pF,50V		
C 34	Cer,(CK924C1H222M)	2200pF,±20%,50V		
C 35	Cer,(CK924C1H222M)	2200pF,±20%,50V		
C 36	Plast,(ECQ-M1H 473KZ)	0.047μF,±10%,50V		
C 37	Plast,(ECQ-M1H 473KZ)	0.047μF,±10%,50V		
C 38	Plast,(ECQ-M1H 104KZ)	0.1μF,±10%,50V		
C 39	Plast,(ECQ-M1H 103KZ)	0.01μF,±10%,50V		
C 40	Cer,(CC924CH1H100D)	10pF,±0.5pF,50V		
C 41	Elect,(CE04W1J2R2)	2.2μF,±20%,63V		
C 42	Elect,(CE04W1J2R2)	2.2μF,±20%,63V		

( ): Manufacturer's part number
* : Selected at factory,

Table 6-6 COMPONENT LIST OF CRYSTAL OSCILLATOR & BB SWEEPER (Z5)

CKT REF	DESCRIPTION	RATING		NOTE
C 43	Elect,(CE04W1J1R0)	1.0μF,±20%,63V		
C 44	Elect,(CE04W1J2R2)	2.2μF,±20%,63V		
C 45	Elect,(CE04W1V220)	22μF,±20%,35V		
C 46	Elect,(CE04W1V220)	22μF,±20%,35V		
C 47	Plast,(ECQ-M1H 103KZ)	0.01μF,±10%,50V		
C 48	Plast,(ECQ-M1H 103KZ)	0.01μF,±10%,50V		
C 49	Elect,(CE04W1V220)	22μF,±20%,35V		
C 50	Elect,(CE04W1V220)	22μF,±20%,35V		
C 51	Elect,(CE04W1V220)	22μF,±20%,35V		
C 52	Elect,(CE04W1V220)	22μF,±20%,35V		
C 53	Elect,(CE04W1J010)	1μF,±20%,63V		
C 54	Plast,(ECQ-M1H 104KZ)	0.1μF,±10%,50V		
C 55	Plast,(ECQ-M1H 104KZ)	0.1μF,±10%,50V		
C 56	Plast,(ECQ-M1H 104KZ)	0.1μF,±10%,50V		
C 57	Plast,(ECQ-M1H 104KZ)	0.1μF,±10%,50V		
C 58	Elect,(CE04W1J010)	1μF,±20%,63V		
C 59	Elect,(CE04W1V220)	22μF,±20%,35V		
C 60	Cer,(RPE111CH131G50)	130pF,±2%,50V		
C 61	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C 62	Cer,(CK924C1H102M)	1000pF,±20%,50V		
J 1	Receptacle,(BNC-R-NI)			
J 2	Receptacle,(27DP-BR)			
J 3				Pattern
K 1	Relay,(MT03A)			
L 1	Microinductor,(LF8-101K)	100μH		
L 2	Coil,(442L43434A)			
L 3	Coil,(44L45322C)			
L 4	Microinductor,(LF8-101K)	100μH		ME538K/L/M
L 5	Coil,(442L43434B)			ME538K/L/M
L 6	Coil,(44L45322B)			ME538K/L/M
L 7	Microinductor,(SP0408-R47K)	0.47μH		
L 8	Microinductor,(LF8-101K)	100μH		
L 9	Coil,(44L45340B)			Q'ty or 1*
L 10	Coil,(34L74432C)			

( ): Manufacturer's part number
* : Selected at factory

Table 6-6 COMPONENT LIST OF CRYSTAL OSCILLATOR & BB SWEEPER (Z5)

CKT REF	DESCRIPTION	RATING		NOTE
L 11	OSC coil, (44L63392D)			
L 12	OSC coil, (44L16004P)			
L 13	Coil, (10K17-85T)			
L 14	Coil, (10K17-85T)			
L 15	Microinductor, (LF8-221K)	220uH		
L 16	Microinductor, (LF8-221K)	220uH		
L 17	Microinductor, (LF8-221K)	220uH		
L 18	Microinductor, (LF8-221K)	220uH		
L 19	Microinductor, (LF8-221K)	220uH		
L 20	Microinductor, (LF8-221K)	220uH		
L 21	Microinductor, (LF8-221K)	220uH		
L 22	Microinductor, (LF8-221K)	220uH		
Q 1	Tr, Si, NPN, (2SC2368)			
Q 2	Tr, Si, NPN, (2SC2368)			
Q 3	Tr, Si, NPN, (2SC2368)			ME538K/L/M
Q 4	Tr, Si, NPN, (2SC2368)			ME538K/L/M
Q 5	Tr, Si, NPN, (2SC1252)			
Q 6	Tr, Si, NPN, (2SC1252)			
Q 7	Tr, Si, NPN, (2SC1252)			
Q 8	IC, (uPC251C)			
Q 9	Di, Si, (1S953)			
Q 10	Di, Si, (1S953)			
Q 11	IC, (uPC251C)			
Q 12	Di, Si, (1S953)			
Q 13	Di, Si, (1S953)			
Q 14	Di, var, (FC52M)			
Q 15	Di, var, (FC52M)			
Q 16	J-FET, N ch, (2SK55E)			
Q 17	J-FET, N ch, (2SK55E)			
Q 18	Tr, Si, NPN, (2SC1252)			
Q 19	IC, (UA733C)			
Q 20	Tr, Si, NPN, (2SC2718)			
Q 21	Tr, Si, NPN, (2SC2718)			
Q 22	Tr, Si, NPN, (2SC2718)			
Q 23	Tr, Si, NPN, (2SC2718)			
Q 24	IC, (74LS293)			
Q 25	IC, (74LS122)			

( ): Manufacturer's part number
* : Selected at factory

Table 6-6 COMPONENT LIST OF CRYSTAL OSCILLATOR & BB SWEEPER (Z5)

CKT REF	DESCRIPTION	RATING		NOTE
Q 26	Tr, Si, NPN, (2SC1254)			
Q 27	Tr, Si, NPN, (2SC1254)			
Q 28	Tr, Si, PNP, (2SA1151)			
Q 29	Tr, Si, PNP, (2SA1151)			
Q 30	Tr, Si, PNP, (2SA1151)			
Q 31	IC, (uPC151C)			
Q 32	Di, breakdown, (RD5.1E)	4.8 to 5.7V, 400mW		
Q 33	Tr, Si, NPN, (2SC2718)			
Q 34	Di, breakdown, (02BZ3.3)	2.8 to 3.8V, 250mW		
Q 35	IC, (uPC251C)			
Q 36	J-FET, N ch, (2SK55E)			
Q 37	Di, Si, (1S953)			
Q 38	Di, Si, (1S953)			
R 1	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W		
R 2	CF, (ARD25T472J)	4.7kΩ, ±5%, 1/4W		
R 3	CF, (ARD25T562J)	5.6kΩ, ±5%, 1/4W		
R 4	Var, MF, (RJ-6S 5kΩ)	5kΩ, 1/2W		
R 5	CF, (ARD25T102J)	1kΩ, ±5%, 1/4W		
R 6	CF, (ARD25T223J)	22kΩ, ±5%, 1/4W		
R 7	CF, (ARD25T563J)	56kΩ, ±5%, 1/4W		
R 8	CF, (ARD25T471J)	470Ω, ±5%, 1/4W		
R 9	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W		ME538A/B/C
R 10	CF, (ARD25T472J)	4.7kΩ, ±5%, 1/4W		ME538A/B/C
R 11	CF, (ARD25T152J)	1.5kΩ, ±5%, 1/4W		ME538A/B/C
R 12	Var, MF, (RJ-6S 2kΩ)	2kΩ, 1/2W		ME538A/B/C
R 13	CF, (ARD25T102J)	1kΩ, ±5%, 1/4W		ME538A/B/C
R 14	CF, (ARD25T153J)	15kΩ, ±5%, 1/4W		ME538A/B/C
R 15	CF, (ARD25T183J)	18kΩ, ±5%, 1/4W		ME538A/B/C
R 16	CF, (ARD25T471J)	470Ω, ±5%, 1/4W		ME538A/B/C
R 17	MF, (NRN1/4C4 71.2ΩD)	71.2Ω, ±0.5%, 1/4W		
R 18	CF, (ARD25T331J)	330Ω, ±5%, 1/4W		
R 19	CF, (ARD25T681J)	680Ω, ±5%, 1/4W		
R 20	CF, (ARD25T181J)	180Ω, ±5%, 1/4W		Q'ty 2, Parallel
R 21	MF, (NRN1/4C4 35.7ΩD)	35.7Ω, ±0.5%, 1/4W		
R 22	CF, (ARD25T101J)	100Ω, ±5%, 1/4W		
R 23	CF, (ARD25T222J)	2.2kΩ, ±5%, 1/4W		
R 24	CF, (ARD25T332J)	3.3kΩ, ±5%, 1/4W		
R 25	Var, MF, (RJ-6S 100Ω)	100Ω, 1/2W		
R 26	CF, (ARD25T331J)	330Ω, ±5%, 1/4W		
R 27	CF, (ARD25T392J)	3.9kΩ, ±5%, 1/4W		
R 28	CF, (ARD25T102J)	1kΩ, ±5%, 1/4W		
R 29	CF, (ARD25T750J)	75Ω, ±5%, 1/4W		
R 30	CF, (ARD25T*J)	100kΩ to 1MΩ, ±5%, 1/4W		*

( ): Manufacturer's part number
* : Selected at factory

Table 6-6 COMPONENT LIST OF CRYSTAL OSCILLATOR & BB SWEEPER (Z5)

CKT REF	DESCRIPTION	RATING		NOTE
R 31	Var, MF, (RJ-6S 20kΩ)	20kΩ, 1/2W		
R 32	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W		
R 33	CF, (ARD25T105J)	1MΩ, ±5%, 1/4W		
R 34	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W		
R 35	CF, (ARD25T104J)	100kΩ, ±5%, 1/4W		
R 36	CF, (ARD25T102J)	1kΩ, ±5%, 1/4W		
R 37	CF, (ARD25T104J)	100kΩ, ±5%, 1/4W		
R 38	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W		
R 39	CF, (ARD25T104J)	100kΩ, ±5%, 1/4W		
R 40	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W		
R 41	CF, (ARD25T684J)	680kΩ, ±5%, 1/4W		
R 42	CF, (ARD25T684J)	680kΩ, ±5%, 1/4W		
R 43	CF, (ARD25T102J)	1kΩ, ±5%, 1/4W		
R 44	CF, (ARD25T152J)	1.5kΩ, ±5%, 1/4W		
R 45	Var, MF, (RJ-6P 50kΩ)	50kΩ, 1/2W		
R 46	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W		
R 47	CF, (ARD25T152J)	1.5kΩ, ±5%, 1/4W		
R 48	CF, (ARD25T680J)	68Ω, ±5%, 1/4W		
R 49	CF, (ARD25T332J)	3.3kΩ, ±5%, 1/4W		
R 50	CF, (ARD25T332J)	3.3kΩ, ±5%, 1/4W		
R 51	CF, (ARD25T680J)	68Ω, ±5%, 1/4W		
R 52	Not assigned			
R 53	CF, (ARD25T101J)	100Ω, ±5%, 1/4W		
R 54	CF, (ARD25T101J)	100Ω, ±5%, 1/4W		
R 55	CF, (ARD25T221J)	220Ω, ±5%, 1/4W		
R 56	CF, (ARD25T750J)	75Ω, ±5%, 1/4W		
R 57	CF, (ARD25T392J)	3.9kΩ, ±5%, 1/4W		
R 58	CF, (ARD25T102J)	1kΩ, ±5%, 1/4W		
R 59	CF, (ARD25T750J)	75Ω, ±5%, 1/4W		
R 60	CF, (ARD25T750J)	75Ω, ±5%, 1/4W		
R 61	CF, (ARD25T750J)	75Ω, ±5%, 1/4W		
R 62	CF, (ARD25T472J)	4.7kΩ, ±5%, 1/4W		
R 63	CF, (ARD25T472J)	4.7kΩ, ±5%, 1/4W		
R 64	CF, (ARD25T301J)	300Ω, ±5%, 1/4W		
R 65	CF, (ARD25T471J)	470Ω, ±5%, 1/4W		
R 66	CF, (ARD25T222J)	2.2kΩ, ±5%, 1/4W		
R 67	CF, (ARD25T102J)	1kΩ, ±5%, 1/4W		
R 68	CF, (ARD25T102J)	1kΩ, ±5%, 1/4W		
R 69	CF, (ARD25T471J)	470Ω, ±5%, 1/4W		
R 70	CF, (ARD25T471J)	470Ω, ±5%, 1/4W		
R 71	CF, (ARD25T821J)	820Ω, ±5%, 1/4W		
R 72	MF, (RN14K2E1002D)	10kΩ, ±0.5%, 1/4W		
R 73	CF, (ARD25T102J)	1kΩ, ±5%, 1/4W		
R 74	CF, (ARD25T101J)	100Ω, ±5%, 1/4W		
R 75	CF, (ARD25T681J)	680Ω, ±5%, 1/4W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-6 COMPONENT LIST OF CRYSTAL OSCILLATOR & BB SWEEPER (Z5)

CKT REF	DESCRIPTION	RATING		NOTE
R 76	CF, (ARD25T681J)	680Ω, ±5%, 1/4W		
R 77	CF, (ARD25T122J)	1.2kΩ, ±5%, 1/4W		
R 78	CF, (ARD25T332J)	3.3kΩ, ±5%, 1/4W		
R 79	CF, (ARD25T392J)	3.9kΩ, ±5%, 1/4W		
R 80	MF, (RN14K2E2741D)	2.74kΩ, ±0.5%, 1/4W		
R 81	CF, (ARD25T102J)	1kΩ, ±5%, 1/4W		
R 82	CF, (ARD25T105J)	1MΩ, ±5%, 1/4W		
R 83	CF, (ARD25T222J)	2.2kΩ, ±5%, 1/4W		
R 84	CF, (ARD25T272J)	2.7kΩ, ±5%, 1/4W		
R 85	MF, (RN14K2E1151D)	1.15kΩ, ±0.5%, 1/4W		
R 86	CF, (ARD25T472J)	4.7kΩ, ±5%, 1/4W		
R 87	CF, (ARD25T560J)	56Ω, ±5%, 1/4W		
R 88	Var, MF, (RJ-6P 10kΩ)	10kΩ, 1/2W		
R 89	CF, (ARD25T681J)	680Ω, ±5%, 1/4W		
R 90	MF, (NRN1/4C4 17.4ΩD)	17.4Ω, ±0.5%, 1/4W		
R 91	CF, (ARD25T271J)	270Ω, ±5%, 1/4W		
R 92	CF, (ARD25T683J)	68kΩ, ±5%, 1/4W		
R 93	CF, (ARD25T*J)	22k to 47kΩ, ±5%, 1/4W		*
R 94	CF, (ARD25T683J)	68kΩ, ±5%, 1/4W		
R 95	Var, MF, (RJ-6S 20kΩ)	20kΩ, 1/2W		
R 96	CF, (ARD25T683J)	68kΩ, ±5%, 1/4W		
R 97	CF, (ARD25T220J)	22Ω, ±5%, 1/4W		
R 98	CF, (ARD25T273J)	27kΩ, ±5%, 1/4W		
R 99	Var, MF, (RJ-6S 10kΩ)	10kΩ, 1/2W		
R 100	CF, (ARD25T224J)	220kΩ, ±5%, 1/4W		
R 101	CF, (ARD25T154J)	150kΩ, ±5%, 1/4W		
R 102	CF, (ARD25T272J)	2.7kΩ, ±5%, 1/4W		
R 103	CF, (ARD25T*J)	1k to 4.7kΩ, ±5%, 1/4W		
R 104	CF, (ARD25T334J)	330kΩ, ±5%, 1/4W		
R 105	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W		
R 106	CF, (ARD25T104J)	100kΩ, ±5%, 1/4W		
R 107	Thermistor, (OS-D5-300-1)	300Ω		
R 108	CF, (ARD25T331J)	330Ω, ±5%, 1/4W		
R 109	CF, (ARD25T681J)	680Ω, ±5%, 1/4W		
R 110	CF, (ARD25T331J)	330Ω, ±5%, 1/4W		
R 111	CF, (ARD25T271J)	270Ω, ±5%, 1/4W		
X 1	XTAL OSC, (44X46820)	70MHz		
X 2	XTAL OSC, (44X46821)	140MHz		
Z 1	M7 D.B.M			

( ): Manufacturer's part number
* : Selected at factory

Table 6-7 COMPONENT LIST OF MOTHER BOARD (Z8)

CKT REF	DESCRIPTION	RATING		NOTE
J 1	Connector, (DF1-15P2.5DSA)	15 pins		
J 2	Connector, (225J-22221-587	44 pins		
J 3	Connector, (225J-22221-587)	44 pins		
J 4	Connector, (225J-22221-587)	44 pins		
J 5	Connector, (225J-22221-587)	44 pins		
J 6	Not assigned			
J 7	Not assigned			
J 8	Connector, (DF1-20P-2.5DS)	20 pins		
J 9	Connector, (DF1-20P-2.5DS)	20 pins		
J10	Connector, (HIF23A-50D-AA20S)	50 pins		
J11	Connector,(U-PA1019)	10 pins		
J12	Connector, (DF1-15P2.5DS)	15 pins		
Q 1	Di,(1S953)			
Q 2	Di,(1S953)			
Q 3	Di,(1S953)			
R 1	Var,MF,(RJ-6P 10kΩ)	10kΩ,1/2W		

( ): Manufacturer's part number
* : Selected at factory

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Table 6-8 COMPONENT LIST OF LED BOARD (Z9)

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer,(CK9241H104M)	0.1μF,±20%,50V		
C 2	Cer,(CK9241H104M)	0.1μF,±20%,50V		
C 3	Cer,(CK9241H104M)	0.1μF,±20%,50V		
C 4	Cer,(CK9241H104M)	0.1μF,±20%,50V		
C 5	Plast,(ECQ-M1H223KZ)	0.022μF,±10%,50V		
C 6	Elect,(CE04W1V100)	10μF,±20%,35V		
C 7	Elect,(CE04W1A221)	220μF,±20%,10V		
C 8	Elect,(CE04W1V220)	22μF,±20%,35V		
C 9	Elect,(CE04W1V220)	22μF,±20%,35V		
C10	Not assigned			
C11	Elect,(CE04W1V220)	22μF,±20%,35V		
C12	Not assigned			
C13	Plast,(ECQ-M1H223KZ)	0.022μF,±10%,50V		
C14	Not assigned			
C15	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C16	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C17	Cer,(CK924C1H472M)	4700pF,±20%,50V		
J 1	Connector, (HIF3-40P-2.54DSA)	40 pins		
J 2	Connector, (DF1-10P2.5DSA)	10 pins		
J 3	Connector, (DF1-10P1.5DSA)	10 pins		
K 1	Relay,(NF2E-12V)			
L 1	Microinductor,(LH1-102K)	1mH		
L 2	Not assigned			
L 3	Microinductor, (LF8-221K)	220μH		
Q 1	IC,(74LS157)			
Q 2	IC,(74LS248)			
Q 3	IC,(μPA56C)			
Q 4	IC,(74LS248)			
Q 5	IC,(μPA56C)			
Q 6	IC,(74LS248)			
Q 7	IC,(μPA56C)			
Q 8 to Q19	Di,(LN513GK)			

( ): Manufacturer's part number
* : Selected at factory

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Table 6-8 COMPONENT LIST OF LED BOARD (Z9)

CKT REF	DESCRIPTION	RATING		NOTE
Q20	Not assigned			
Q21	IC,(μPA57C)			
Q22	IC,(μPA56C)			
Q23	Not assigned			
Q24	Not assigned			
Q25	IC,(μPA57C)			
Q26	LED,(LN38GP)			
Q27	LED,(LN38GP)			
Q28	LED,(LN38GP)			
Q29	LED,(LN38GP)			
Q30	LED,(LN38GP)			
Q31	LED,(LN38GP)			
Q32	Not assigned			
Q33	Not assigned			
Q34	Not assigned			
Q35	Not assigned			
Q36	Not assigned			
Q37	LED,(LN38GP)			
Q38	LED,(LN38GP)			
Q39	LED,(LN38GP)			
Q40	LED,(LN38GP)			
Q41	LED,(LN38GP)			
Q42	LED,(LN38GP)			
Q43	Not assigned			
Q44	Not assigned			
Q45	Not assigned			
Q46	LED,(LN38GP)			
Q47	LED,(LN38GP)			
Q48	LED,(LN38GP)			
Q49	LED,(LN38GP)			
Q50	LED,(LN38GP)			
Q51	LED,(LN38GP)			
Q52	Not assigned			
Q53	Not assigned			
Q54	Not assigned			
Q55	LED,(LN38GP)			
Q56	LED,(LN38GP)			
Q57	LED,(LN38GP)			
Q58	LED,(LN38GP)			
Q59	LED,(LN38GP)			
Q60	LED,(LN38GP)			
Q61 to Q72	Not assigned			
Q73	LED,(LN38GP)			
Q74	LED,(LN38GP)			

( ): Manufacturer's part number
* : Selected at factory

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Table 6-8 COMPONENT LIST OF LED BOARD (Z9)

CKT REF	DESCRIPTION	RATING		NOTE
Q75	LED,(LN38GP)			
Q76	LED,(LN38GP)			
Q77	Not assigned			
Q78	LED,(LN38GP)			
Q79	LED,(LN38GP)			
Q80	Not assigned			
Q81	Not assigned			
Q82	Di,(1S953)			
Q83	Di,(1S953)			
Q84	Not assigned			
Q85	IC,(74LS04)			
Q86	IC,(74LS00)			
Q87	IC,(74LS00)			
Q88	IC,(74LS04)			
Q89	IC,(74LS74A)			
Q90	IC,(74LS74A)			
Q91	IC,(μPA57C)			
Q92	Tr,(2SA1151)			
Q93	Di,(1S953)			
Q94	Di,(1S953)			
Q95	Di,breakdown,(1SZ52)	5.9 to 6.5V,400mW		
R 1	CF,(ARD25T100J)	10Ω,±5%,1/4W		
R 2	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R 3	CF,(ARD25T100J)	10Ω,±5%,1/4W		
R 4	CF,(ARD25T100J)	10Ω,±5%,1/4W		
R 5	CF,(ARD25T100J)	10Ω,±5%,1/4W		
R 6	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R 7	Not assigned			
R 8	CF,(ARD25P221J)	220Ω,±5%,1/4W		
R 9	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R10	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R11	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R12	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R13	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R14	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R15	CF,(ARD25T391J)	390Ω,±5%,1/4W		
R16	Not assigned			
R17	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R18	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R19	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R20	Not assigned			
R21	Var,MF,(RJ-6P 5kΩ)	5kΩ,1/2W		
R22	Var,MF,(RG161N20SB1kΩM)	1kΩ,1/2W		
R23	MF,(RN14K2E7320D)	732Ω,±0.5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

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Table 6-8 COMPONENT LIST OF LED BOARD (Z9)

CKT REF	DESCRIPTION	RATING		NOTE
R24	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R25	Var,MF,(RG161N20SB 100ΩM)	100Ω,1/2W		
R26	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R27	CF,(ARD25T473J)	47kΩ,±5%,1/4W		
R28	PMTR,WW,(20HP-5S 10kΩ)	10kΩ,1/2W		
R29	Not assigned			
R30	MF,(RN14K2E3012D)	30.1kΩ,±0.5%,1/4W		
R31	Single in-line array, (IHR-4-472JA)	4.7kΩ x 4,1/8W		
R32	Single in-line array, (IHR-4-152JA)	15kΩ x 4,1/8W		
R33	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R34	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R35	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R36	Var,MF,(RG161N20SB 10kΩM)	10kΩ,1/2W		
R37	MF,(RN14K2E1472D)	14.7kΩ,±0.5%,1/4W		
R38	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R39	Not assigned			
R40	Dual in-line array, (AHR-680JB)	68Ω,1/8W		
R41	Dual in-line array, (AHR-680JB)	68Ω,1/8W		
R42	Dual in-line array, (AHR-680JB)	68Ω,1/8W		
S 1	Slide switch, (SL7-4(PH)8H6-2-2)			ME538 (Short)
S 2	Not assigned			
S 3	Not assigned			
S 4	Yellow green switch, (HL20-LSYG)			
S 5	Yellow green switch, (HL20-LSYG)			
S 6	Yellow green switch, (HL20-LSYG)			

( ): Manufacturer's part number
* : Selected at factory

Table 6-9 COMPONENT LIST OF FRONT BOARD (Z10)

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V		
C 2	Elect,(CE04W1E470)	47μF,±20%,25V		
C 3	Tant,(CS02H1V010M)	1μF,±20%,35V		
C 4	Tant,(CS02H1V010M)	1μF,±20%,35V		
C 5	Tant,(CS02H1V010M)	1μF,±20%,35V		
C 6	Plast,(ECQ-P1 334FZ)	0.33μF,±1%,100V		
C 7	Plast,(ECQ-P1 334FZ)	0.33μF,±1%,100V		
C 8	Not assigned			
C 9	Not assigned			
C10	Plast,(ECQ-M1H104KZ)	0.1μF,±10%,50V		Q'ty 2, Parallel
C11	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V		
C12	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V		
C13	Elect,(CE04W1J010)	1μF,±20%,63V		
C14	Tant,(CS02H1V010M)	1μF,±20%,35V		
C15	Tant,(CS02H1V010M)	1μF,±20%,35V		
C16	Tant,(CS02H1D2R2M)	2.2μF,±20%,20V		
C17	Cer,(CC924CH1H510J)	51pF,±5%,50V		
C18	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C19	Not assigned			
C20	Plast,(ECQ-M1H103KZ)	0.01μF,±20%,50V		
C21	Plast,(ECQ-M1H103KZ)	0.01μF,±20%,50V		
C22	Elect,(CE04W1V220)	22μF,±20%,35V		
C23	Elect,(CE04W1J010)	1μF,±20%,63V		
C24	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V		
C25	Plast,(ECQ-M1H222KZ)	2200pF,±10%,50V		}Parallel
	Cer,(RPE111CH751G50)	750pF,±2%,50V		
C26	Cer,(CC924CH1H221J)	220pF,±5%,50V		}Parallel
	Cer,(CC924CH1H471J)	470pF,±5%,50V		
C27	Plast,(ECQ-M1H332KZ)	3300pF,±10%,50V		}Parallel
	Cer,(CC924CH1H471J)	470pF,±5%,50V		
C28	Cer,(CC924CH1H471J)	470pF,±5%,50V		
C29	Plast,(ECQ-M1H332KZ)	3300pF,±10%,50V		}Parallel
	Cer,(CC924CH1H331J)	330pF,±5%,50V		
C30	Cer,(CK924C1H473M)	0.047μF,±20%,50V		
C31	Elect,(CE04W1E221)	220μF,±20%,25V		
C32	Elect,(CE04W1V220)	22μF,±20%,35V		
C33	Elect,(CE04W1V220)	22μF,±20%,35V		
C34	Elect,(CE04W1E101)	100μF,±20%,25V		
C35	Elect,(CE04W1E221)	220μF,±20%,25V		
C36	Elect,(CE04W1V220)	22μF,±20%,35V		
C37	Elect,(CE04W1V220)	22μF,±20%,35V		
C38	Elect,(CE04W1V220)	22μF,±20%,35V		
C39	Elect,(CE04W1V220)	22μF,±20%,35V		
C40	Elect,(CE04W1V220)	22μF,±20%,35V		
C41	Not assigned			
C42	Elect,(CE04W1V220)	22μF,±20%,35V		

( ): Manufacturer's part number
* : Selected at factory

Table 6-9 COMPONENT LIST OF FRONT BOARD (Z10)

CKT REF	DESCRIPTION	RATING		NOTE
C43	Not assigned			
C44	Cer,(CC924CH1H101J)	100pF,±5%,50V		
C45	Elect,(CE04W1J2R2)	2.2μF,±20%,63V		
C46	Plast,(ECQ-M1H104KZ)	0.1μF,±10%,50V		
C47	Plast,(ECQ-M1H104KZ)	0.1μF,±10%,50V		
C48	Elect,(CE04W1V220)	22μF,±20%,35V		
C49	Elect,(CE04W1V220)	22μF,±20%,35V		
C50	Not assigned			
C51	Elect,(CE04W1V220)	22μF,±20%,35V		
C52	Elect,(CE04W1V220)	22μF,±20%,35V		
C53	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V		
C54	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V		
C55	Plast,(ECQ-M1H102KZ)	1000pF,±10%,50V		
C56	Cer,(CC924CH1H560J)	56pF,±5%,50V		Q'ty 0 or 1, *
C57	Not assigned			
C58	Plast,(ECQ-P1*FZ)	2400pF to 0.01μF, ±1%,100V		*
C59	Plast,(ECQ-M1H104KZ)	0.1μF,±10%,50V		
J 1	Connector, (HIF3A-50P-2.54DSA)	50 pins		
J 2	Connector,(PI011-2M)			
J 3	Connector,(PI011-2M)			
J 4	Not assigned			
J 5	Connector,(PI011-2M)			
J 6	Panel jack,(SP-3CPJ)			K type
	Panel jack,(J3WE-2)			L/M type
J 7	Plug,(BNC-P620)			
J 8	Connector,(PI011-2M)			
J 9	Not assigned			
K 1	Not assigned			
K 2	Reed relay,(PRBD-4)			
K 3	Reed relay,(PRAD-4)			
L 1	Coil,(FS0810S-102K)	1mH		
L 2	Not assigned			
L 3	Coil,(339T20168H)	10mH		
L 4	Not assigned			
L 5	Coil,(LH1-102K)	1mH		
L 6	Coil,(LH1-333K)	33mH		
L 7	Coil,(LH1-333K)			
L 8	Coil,(LF8-221K)	220μH		

( ): Manufacturer's part number
* : Selected at factory

Table 6-9 COMPONENT LIST OF FRONT BOARD (Z10)

CKT REF	DESCRIPTION	RATING		NOTE
L 9	Coil,(LF8-221K)	220μH		
L10	Coil,(LV4-902)			
L11	Coil,(LV4-712)			
L12	Coil,(LV4-712)			
L13	Coil,(LH1-102K)	1mH		
L14	Microinductor, (LF8-221K)	220μH		
L15	Microinductor, (LF8-221K)	220μH		
L16	Microinductor, (LF8-221K)	220μH		
L17	Microinductor, (LF8-221K)	220μH		
L18	Microinductor, (LF8-221K)	220μH		
L19	Not assigned			
L20	Coil,(44L46022F)			
L21	Coil,(44L46022F)			
L22	Microinductor, (LF8-221K)	220μH		
L23	Inductor, (LV2-332)	3.3mH		
Q 1	IC,(μPC251C)			
Q 2	IC,(μPC251C)			
Q 3	IC,(μPC251C)			
Q 4	Tr,(2SK55E)			
Q 5	Di,(1S953)			
Q 6	Di,(1S953)			
Q 7	Di,(1S953)			
Q 8	Di,(1S953)			
Q 9	Di,(1S953)			
Q10	Tr,(2SC1253)			
Q11	Di,breakdown,(1SZ52)	5.9 to 6.5V,250mW		
Q12	Tr,(2SC1254)			
Q13	Tr,(2SC2718)			
Q14	Not assigned			
Q15	IC,(74121)			
Q16	Tr,(2SC1254)			
Q17	Tr,(2SC1254)			
Q18	Tr,(2SA711)			
Q19	Tr,(2SA711)			
Q20	Tr,(2SA1151)			
Q21	IC,(μPC258C)			
Q22	Di,breakdown,(1SZ52)	5.9 to 6.5V,250mW		
Q23	IC,(μPC154)			
Q24	Di,(1S953)			

( ): Manufacturer's part number
* : Selected at factory

Table 6-9 COMPONENT LIST OF FRONT BOARD (Z10)

CKT REF	DESCRIPTION	RATING		NOTE
Q25	IC,(μPC151C)			
Q26	Di,(1S953)			
Q27	Di,(1S953)			
Q28	IC,(μPC251C)			
Q29	Di,(1S953)			
Q30	LED,(TLG226)			
Q31	IC,(μPC251C)			
Q32	Di,(1S953)			
Q33	Di,(1S953)			
Q34	Di,breakdown,(RD9.1EB)	8.5 to 9.6V,400mW		
Q35	Not assigned			
R 1	Var,MF,(RJ-6P 50kΩ)	50kΩ,1/2W		
R 2	Var,MF,(RJ-6P 50kΩ)	50kΩ,1/2W		
R 3	Var,MF,(RJ-6P 20kΩ)	20kΩ,1/2W		
R 4	Var,MF,(RJ-6P 20kΩ)	20kΩ,1/2W		
R 5	Var,MF,(RJ-6P 10kΩ)	10kΩ,1/2W		
R 6	Var,MF,(RJ-6P 10kΩ)	10kΩ,1/2W		
R 7	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R 8	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R 9	MF,(RN14K2E1002D)	10kΩ,±0.5%,1/4W		
R10	MF,(RN14K2E1002D)	10kΩ,±0.5%,1/4W		
R11	MF,(RN14K2E1002D)	10kΩ,±0.5%,1/4W		
R12	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R13	MF,(RN14K2E1002D)	10kΩ,±0.5%,1/4W		
R14	MF,(RN14K2E1002D)	10kΩ,±0.5%,1/4W		
R15	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R16	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R17	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R18	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R19	Var,MF,(RJ-6P 1kΩ)	1kΩ,1/2W		
R20	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R21	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R22	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R23	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R24	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R25	MF,(NRN1/4C4 75ΩD)	75Ω,±0.5%,1/4W		
R26	MF,(NRN1/4C4 35.7ΩD)	35.7Ω,±0.5%,1/4W		
R27	MF,(NRN1/4C4 144.4ΩD)	144.4Ω,±0.5%,1/4W		
R28	MF,(NRN1/4C4 107ΩD)	107Ω,±0.5%,1/4W		
R29	MF,(NRN1/4C4 144.4ΩD)	144.4Ω,±0.5%,1/4W		
R30	MF,(NRN1/4C4 91.7ΩD)	91.7Ω,±0.5%,1/4W		
R31	MF,(NRN1/4C4 371ΩD)	371Ω,±0.5%,1/4W		
R32	MF,(NRN1/4C4 91.7ΩD)	91.7Ω,±0.5%,1/4W		
R33	MF,(NRN1/4C4 79.9ΩD)	79.9Ω,±0.5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-9 COMPONENT LIST OF FRONT BOARD (Z10)

CKT REF	DESCRIPTION	RATING		NOTE
R34	MF,(NRN1/4C4 1.185kΩD)	1.185kΩ,±0.5%,1/4W		
R35	MF,(NRN1/4C4 79.9ΩD)	79.9Ω,±0.5%,1/4W		
R36	MF,(NRN1/4C4 91.7ΩD)	91.7Ω,±0.5%,1/4W		
R37	MF,(NRN1/4C4 371ΩD)	371Ω,±0.5%,1/4W		
R38	MF,(NRN1/4C4 91.7ΩD)	91.7Ω,±0.5%,1/4W		
R39	MF,(NRN1/4C4 91.7ΩD)	91.7Ω,±0.5%,1/4W		
R40	MF,(NRN1/4C4 371ΩD)	371Ω,±0.5%,1/4W		
R41	MF,(NRN1/4C4 91.7ΩD)	91.7Ω,±0.5%,1/4W		
R42	MF,(NRN1/4C4 91.7ΩD)	91.7Ω,±0.5%,1/4W		
R43	MF,(NRN1/4C4 371ΩD)	371Ω,±0.5%,1/4W		
R44	MF,(NRN1/4C4 91.7ΩD)	91.7Ω,±0.5%,1/4W		
R45	MF,(NRN1/4C4 79.9ΩD)	79.9Ω,±0.5%,1/4W		
R46	MF,(NRN1/4C4 1.185kΩD)	1.185kΩ,±0.5%,1/4W		
R47	MF,(NRN1/4C4 79.9ΩD)	79.9Ω,±0.5%,1/4W		
R48	MF,(NRN1/4C4 79.9ΩD)	79.9Ω,±0.5%,1/4W		
R49	MF,(NRN1/4C4 1.185kΩD)	1.185kΩ,±0.5%,1/4W		
R50	MF,(NRN1/4C4 79.9ΩD)	79.9Ω,±0.5%,1/4W		
R51	MF,(NRN1/4C4 79.9ΩD)	79.9Ω,±0.5%,1/4W		
R52	MF,(NRN1/4C4 1.185kΩD)	1.185kΩ,±0.5%,1/4W		
R53	MF,(NRN1/4C4 79.9ΩD)	79.9Ω,±0.5%,1/4W		
R54	Not assigned			
R55	Not assigned			
R56	Var,MF,(RG161N20SB 500ΩM)	500Ω,1/2W		
R57	CF,(ARD25T562J)	5.6kΩ,±5%,1/4W		
R58	CF,(ARD25T562J)	5.6kΩ,±5%,1/4W		
R59	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R60	CF,(ARD25T561J)	560Ω,±5%,1/4W		
R61	CF,(ARD25T391J)	390Ω,±5%,1/4W		
R62	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R63	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R64	Not assigned			
R65	MF,(RN14K2E1501D)	1.50kΩ,±0.5%,1/4W		
R66	Not assigned			
R67	Not assigned			
R68	MF,(RN05E2B1002B)	10kΩ,±0.1%,1/8W		
R69	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R70	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R71	CF,(ARD25T122J)	1.2kΩ,±5%,1/4W		
R72	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R73	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R74	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R75	Not assigned			
R76	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R77	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R78	MF,(RN14K2E1541D)	1.54kΩ,±0.5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-9 COMPONENT LIST OF FRONT BOARD (Z10)

CKT REF	DESCRIPTION	RATING		NOTE
R79	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R80	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R81	Var,MF,(RJ-6P 20kΩ)	20kΩ,1/2W		
R82	CF,(ARD25T561J)	560Ω,±5%,1/4W		
R83	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R84	CF,(ARD25T154J)	150kΩ,±5%,1/4W		
R85	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R86	CF,(ARD25T682J)	6.8kΩ,±5%,1/4W		
R87	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R88	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R89	CF,(ARD25T154J)	150kΩ,±5%,1/4W		
R90	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R91	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R92	CF,(ARD25T224J)	220kΩ,±5%,1/4W		
R93	CF,(ARD25T562J)	5.6kΩ,±5%,1/4W		
R94	CF,(ARD25T334J)	330kΩ,±5%,1/4W		
R95	CF,(ARD25T224J)	220kΩ,±5%,1/4W		
R96	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R97	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R98	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R99	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R100	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R101	Var,MF,(RJ-6P 100kΩ)	100kΩ,1/2W		
R102	CF,(ARD25T563J)	56kΩ,±5%,1/4W		
R103	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R104	Var,MF,(RJ-6P 100kΩ)	100kΩ,1/2W		
R105	Var,MF,(RG161N20SB 10kΩM)	10kΩ,1/4W		
R106	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R107	CF,(ARD25T333J)	33kΩ,±5%,1/4W		
R108	Var,MF,(RJ-6P 20kΩ)	20kΩ,1/2W		
R109	Var,MF,(RG161N20SB 20kΩM)	20kΩ,1/2W		BB SWEEPER * Option
R110	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R111	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R112	CF,(ARD25T473J)	47kΩ,±5%,1/4W		
R113	CF,(ARD25T183J)	18kΩ,±5%,1/4W		
R114	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R115	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R116	CF,(ARD25T511J)	510Ω,±5%,1/4W		
R117	CF,(ARD25T*J)	10 to 330Ω,±5%,1/4W		Q'ty 0 or 1, *
R118	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R119	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R120	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R121	CF,(ARD25T272J)	2.7kΩ,±5%,1/4W		
R122	CF,(ARD25T103J)	10kΩ,±5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-9 COMPONENT LIST OF FRONT BOARD (Z10)

CKT REF	DESCRIPTION	RATING		NOTE
R123	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R124	Not assigned			
R125	Not assigned			
R126	Not assigned			
R127	Not assigned			
R128	Not assigned			
R129	CF,(ARD25T473J)	47kΩ,±5%,1/4W		
R130	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
S 1	Pushbutton, (10F102UGr31)			
S 2	Rotary,(MPS33-317S)			

( ): Manufacturer's part number
* : Selected at factory

Table 6-13 COMPONENT LIST OF RANGING AND AVG (Z1)

CKT REF	DESCRIPTION	RATING		NOTE
J 4	Connector, (HIF3-16P-2.54DS)			GP-IB Option
J 5	Connector, (U-PA1521)			
J 6	Connector, (U-PA2221)			
Q 1	IC, (TC4051BP)			
Q 2	IC, (TC4051BP)			
Q 3	IC, (μPC803C)			
Q 4	IC, (μPC258C)			
Q 5	IC, (TC4051BP)			
Q 6	IC, (TC4051BP)			
Q 7	IC, (μPC251C)			
Q 8	IC, (TC4051BP)			
Q 9	IC, (μPC804C)			
Q10	Not assigned			
Q11	Not assigned			
Q12	Not assigned			
Q13	Not assigned			
Q14	Not assigned			
Q15	Not assigned			
Q16	Di, (1S953)			
Q17	Di, (1S953)			
Q18	IC, (TC4053BP)			
Q19	IC, (μPC803C)			
Q20	Di, (1S953)			
Q21	IC, (TC4051BP)			
Q22	IC, (TC4051BP)			
Q23	IC, (TC4051BP)			
Q24	IC, (μPC803C)			
Q25	IC, (μPC258C)			
Q26	IC, (TC4051BP)			
Q27	IC, (TC4051BP)			
Q28	IC, (μPC803C)			
Q29	Di, (1S953)			
Q30	Di, (1S953)			
Q31	IC, (TC4053BP)			
Q32	Not assigned			
Q33	Not assigned			
Q34	Not assigned			
Q35	Not assigned			
Q36	Not assigned			
Q37	Di, breakdown, (RD3.9EB)	3.7 to 4.1V, 400mW		
Q38	Di, breakdown, (RD3.9EB)	3.7 to 4.1V, 400mW		
Q39	Not assigned			
Q40	Di, (1S953)			

( ): Manufacturer's part number
* : Selected at factory

Table 6-13 COMPONENT LIST OF RANGING AND AVG (Z1)

CKT REF	DESCRIPTION	RATING		NOTE
Q41	IC, (TC4052BP)			
Q42	IC, (μPC71A)			
Q43	IC, (μPC251C)			
Q44	Di, breakdown, (RD6.2EB)	5.8 to 6.6V, 400mW		
Q45	Di, breakdown, (RD5.1EB)	4.8 to 5.4V, 400mW		
Q46	Di, (1S953)			
Q47	Di, (1S953)			
Q48	IC, (74LS74A)			
Q49	Not assigned			
Q50	IC, (7450)			
Q51	IC, (74LS14)			
Q52	IC, (TC40H393P)			
Q53	IC, (TC40H393P)			
Q54	Not assigned			
Q55	Not assigned			
Q56	Not assigned			
Q57	Not assigned			
Q58	Di, breakdown, (RD5.1E(3))	4.95 to 5.2V, 400mW		
Q59	IC, (TC4053BP)			
Q60	D/A Converter, (μPC624D)			
Q61	Di, (1S953)			
Q62	IC, (μPC803C)			
Q63	IC, (μPC251C)			
Q64	IC, (μPC251C)			
Q65	IC, (μPC251C)			
Q66	IC, (TC4052BP)			
Q67	IC, (74LS00)			
Q68	IC, (μPC251C)			
Q69	IC, (TC4053BP)			
Q70	IC, (TC4053BP)			
Q71	IC, (μPC804C)			
Q72	Not assigned			
Q73	Di, (1S953)			
Q74	Di, (1S953)			
Q75	IC, (74LS157)			
Q76	IC, (μPC14308H)			
Q77	IC, (μPC16308H)			
Q78	Tr, (2SC2718)			
R 1	MF, (RN14K2E3011D)	3.01kΩ, ±0.5%, 1/4W		
R 2	MF, (RN14K2E2001D)	2kΩ, ±0.5%, 1/4W		
R 3	CF, (ARD25T105J)	1MΩ, ±5%, 1/4W		
R 4	CF, (ARD25T102J)	1kΩ, ±5%, 1/4W		
R 5	MF, (RN14K2E2001D)	2kΩ, ±0.5%, 1/4W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-13 COMPONENT LIST OF RANGING AND AVG (Z1)

CKT REF	DESCRIPTION	RATING		NOTE
R 6	MF, (RN14K2E4990D)	499Ω, ±0.5%, 1/4W		
R 7	MF, (RN14K2E1001D)	1kΩ, ±0.5%, 1/4W		
R 8	MF, (RN14K2E2491D)	2.49kΩ, ±0.5%, 1/4W		
R 9	MF, (RN14K2E4991D)	4.99kΩ, ±0.5%, 1/4W		
R10	MF, (RN14K2E1002D)	10kΩ, ±0.5%, 1/4W		
R11	MF, (RN14K2E2002D)	20kΩ, ±0.5%, 1/4W		
R12	MF, (RN14K2E4991D)	4.99kΩ, ±0.5%, 1/4W		
R13	MF, (RN14K2E4872D)	48.7kΩ, ±0.5%, 1/4W		
R14	CF, (ARD25T122J)	1.2kΩ, ±5%, 1/4W		
R15	MF, (RN14K2E1003D)	100kΩ, ±0.5%, 1/4W		
R16	Not assigned			
R17	Not assigned			
R18	Not assigned			
R19	Not assigned			
Q20	Not assigned			
R21	MF, (RN14K2E1003D)	100kΩ, ±0.5%, 1/4W		
R22	CF, (ARD25T474J)	470kΩ, ±5%, 1/4W		
R23	Var, MF, (RJ-6S 100kΩ)	100kΩ, 1/2W		
R24	Single in-line array, (IHR-8-104JA)	100kΩ x 8, 1/8W		
R25	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W		
R26	CF, (ARD25T104J)	100kΩ, ±5%, 1/4W		
R27	Var, MF, (RJ-6P 10kΩ)	10kΩ, 1/2W		
R28	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W		
R29	CF, (ARD25T684J)	680kΩ, ±5%, 1/4W		
R30	CF, (ARD25T105J)	1MΩ, ±5%, 1/4W		
R31	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W		
R32	CF, (ARD25T684J)	680kΩ, ±5%, 1/4W		
R33	CF, (ARD25T105J)	1MΩ, ±5%, 1/4W		
R34	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W		
R35	CF, (ARD25T221J)	220Ω, ±5%, 1/4W		
R36	CF, (ARD25T221J)	220Ω, ±5%, 1/4W		
R37	Not assigned			
R38	Not assigned			
R39	Not assigned			
R40	Not assigned			
R41	CF, (ARD25T331J)	330Ω, ±5%, 1/4W		
R42	CF, (ARD25T104J)	100kΩ, ±5%, 1/4W		
R43	CF, (ARD25T104J)	100kΩ, ±5%, 1/4W		
R44	CF, (ARD25T104J)	100kΩ, ±5%, 1/4W		
R45	CF, (ARD25T104J)	100kΩ, ±5%, 1/4W		
R46	Var, MF, (RJ-6S 100kΩ)	100kΩ, 1/2W		
R47	CF, (ARD25T104J)	100kΩ, ±5%, 1/4W		
R48	CF, (ARD25T393J)	39kΩ, ±5%, 1/4W		
R49	CF, (ARD25T102J)	1kΩ, ±5%, 1/4W		
R50	Single in-line array, (IHR-8-104JA)	100kΩ x 8, 1/8W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-13 COMPONENT LIST OF RANGING AND AVG (Z1)

CKT REF	DESCRIPTION	RATING		NOTE
R51	CF, (ARD25T105J)	1MΩ, ±5%, 1/4W		
R52	CF, (ARD25T102J)	1kΩ, ±5%, 1/4W		
R53	MF, (RN14K2E2001D)	2kΩ, ±0.5%, 1/4W		
R54	MF, (RN14K2E4990D)	499Ω, ±0.5%, 1/4W		
R55	MF, (RN14K2E1001D)	1kΩ, ±0.5%, 1/4W		
R56	MF, (RN14K2E2491D)	2.49kΩ, ±0.5%, 1/4W		
R57	MF, (RN14K2E4991D)	4.99kΩ, ±0.5%, 1/4W		
R58	MF, (RN14K2E1002D)	10kΩ, ±0.5%, 1/4W		
R59	MF, (RN14K2E2002D)	20kΩ, ±0.5%, 1/4W		
R60	MF, (RN14K2E4991D)	4.99kΩ, ±0.5%, 1/4W		
R61	MF, (RN14K2E4872D)	48.7kΩ, ±0.5%, 1/4W		
R62	CF, (ARD25T122J)	1.2kΩ, ±5%, 1/4W		
R63	MF, (RN14K2E1003D)	100kΩ, ±0.5%, 1/4W		
R64	Not assigned			
R65	Not assigned			
R66	Not assigned			
R67	Not assigned			
R68	Not assigned			
R69	Not assigned			
R70	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W		
R71	CF, (ARD25T684J)	680kΩ, ±5%, 1/4W		
R72	CF, (ARD25T105J)	1MΩ, ±5%, 1/4W		
R73	CF, (ARD25T684J)	680kΩ, ±5%, 1/4W		
R74	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W		
R75	CF, (ARD25T221J)	220Ω, ±5%, 1/4W		
R76	CF, (ARD25T105J)	1MΩ, ±5%, 1/4W		
R77	CF, (ARD25T221J)	220Ω, ±5%, 1/4W		
R78	Not assigned			
R79	CF, (ARD25T331J)	330Ω, ±5%, 1/4W		
R80	Var, MF, (RJ-6S 10kΩ)	10kΩ, 1/2W		
R81	MF, (RN14K2E1003D)	100kΩ, ±0.5%, 1/4W		
R82	CF, (ARD25T474J)	470kΩ, ±5%, 1/4W		
R83	Var, MF, (RJ-6S 100kΩ)	100kΩ, 1/2W		
R84	Not assigned			
R85	Not assigned			
R86	Not assigned			
R87	Not assigned			
R88	Not assigned			
R89	CF, (ARD25T101J)	100Ω, ±5%, 1/4W		
R90	CF, (ARD25T104J)	100kΩ, ±5%, 1/4W		
R91	MF, (RN14K2E1001D)	1kΩ, ±0.5%, 1/4W		
R92	CF, (ARD25T102J)	1kΩ, ±5%, 1/4W		
R93	MF, (RN14K2E4021D)	4.02kΩ, ±0.5%, 1/4W		
R94	CF, (ARD25T105J)	1MΩ, ±5%, 1/4W		
R95	Var, MF, (RJ-6P 500kΩ)	500kΩ, 1/2W		
R96	CF, (ARD25T684J)	680kΩ, ±5%, 1/4W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-13 COMPONENT LIST OF RANGING AND AVG (Z1)

CKT REF	DESCRIPTION	RATING	NOTE
R97	CF,(ARD25T823J)	82kΩ,±5%,1/4W	
R98	Not assigned		
R99	Not assigned		
R100	CF,(ARD25T102J)	1kΩ,±5%,1/4W	
R101	CF,(ARD25T102J)	1kΩ,±5%,1/4W	
R102	CF,(ARD25T102J)	1kΩ,±5%,1/4W	
R103	CF,(ARD25T105J)	1MΩ,±5%,1/4W	
R104	CF,(ARD25T105J)	1MΩ,±5%,1/4W	
R105	CF,(ARD25T682J)	6.8kΩ,±5%,1/4W	
R106	CF,(ARD25T102J)	1kΩ,±5%,1/4W	
R107	CF,(ARD25T682J)	6.8kΩ,±5%,1/4W	
R108	CF,(ARD25T102J)	1kΩ,±5%,1/4W	
R109	CF,(ARD25T102J)	1kΩ,±5%,1/4W	
R110	Not assigned		
R111	CF,(ARD25T102J)	1kΩ,±5%,1/4W	
R112	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W	
R113	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W	
R114	CF,(ARD25T101J)	100Ω,±5%,1/4W	
R115	CF,(ARD25T102J)	1kΩ,±5%,1/4W	
R116	CF,(ARD25T102J)	1kΩ,±5%,1/4W	
R117	CF,(ARD25T682J)	6.8kΩ,±5%,1/4W	
R118	CF,(ARD25T682J)	6.8kΩ,±5%,1/4W	
R119	CF,(ARD25T104J)	100kΩ,±5%,1/4W	
R120	CF,(ARD25T681J)	680Ω,±5%,1/4W	
R121	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W	
R122	CF,(ARD25T102J)	1kΩ,±5%,1/4W	
R123	CF,(ARD25T223J)	22kΩ,±5%,1/4W	
R124	Not assigned		
R125	Var,MF,(RJ-6P 500kΩ)	500k.,1/2W	
R126	MF,(RN14K2E1002D)	10k ,±0.5%,1/4W	
R127	MF,(RN14K2E1002D)	10kΩ,±0.5%,1/4W	
R128	MF,(RN14K2E1002D)	10k ,±0.5%,1/4W	
R129	MF,(RN14K2E1002D)	10k ,±0.5%,1/4W	
R130	MF,(RN14K2E1002D)	10kΩ,±0.5%,1/4W	
R131	MF,(RN14K2E1002D)	10kΩ,±0.5%,1/4W	
R132	MF,(RN14K2E1002D)	10k ,±0.5%,1/4W	
R133	MF,(RN14K2E1002D)	10kΩ,±0.5%,1/4W	
R134	Not assigned		
R135	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W	
R136	Not assigned		
R137	MF,(RN14K2E1002D)	10kΩ,±0.5%,1/4W	
R138	MF,(RN14K2E1002D)	10kΩ,±0.5%,1/4W	
R139	MF,(RN14K2E1002D)	10kΩ,±0.5%,1/4W	
R140	MF,(RN14K2E1002D)	10kΩ,±0.5%,1/4W	
R141	MF,(RN14K2E1002D)	10kΩ,±0.5%,1/4W	
R142	MF,(RN14K2E1002D)	10kΩ,±0.5%,1/4W	

( ): Manufacturer's part number
* : Selected at factory

Table 6-13 COMPONENT LIST OF RANGING AND AVG (Z1)

CKT REF	DESCRIPTION	RATING	NOTE
R143	MF,(RN14K2E1002D)	10kΩ,±0.5%,1/4W	
R144	MF,(RN14K2E1002D)	10kΩ,±0.5%,1/4W	
R145	CF,(ARD25T104J)	100kΩ,±5%,1/4W	
R146	CF,(ARD25T104J)	100kΩ,±5%,1/4W	
R147	CF,(ARD25T102J)	1kΩ,±5%,1/4W	
R148	CF,(ARD25T471J)	470Ω,±5%,1/4W	
R149	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W	
R150	CF,(ARD25T102J)	1kΩ,±5%,1/4W	
R151	CF,(ARD25T102J)	1kΩ,±5%,1/4W	
R152	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W	
R153	MF,(RN14K2E4021D)	4.02kΩ,±0.5%,1/4W	
R154	MF,(RN14K2E1001D)	1kΩ,±0.5%,1/4W	
R155	CF,(ARD25T103J)	10kΩ,±5%,1/4W	
R156	CF,(ARD25T103J)	10kΩ,±5%,1/4W	
R157	CF,(ARD25T104J)	100kΩ,±5%,1/4W	
R158	CF,(ARD25T104J)	100kΩ,±5%,1/4W	
R159	CF,(ARD25T103J)	10kΩ,±5%,1/4W	
R160	CF,(ARD25T105J)	1MΩ,±5%,1/4W	
R161	CF,(ARD25T103J)	10kΩ,±5%,1/4W	
R162	CF,(ARD25T103J)	10kΩ,±5%,1/4W	
R163	CF,(ARD25T221J)	220Ω,±5%,1/4W	
R164	CF,(ARD25T221J)	220Ω,±5%,1/4W	
R165	MF,(RN14K2E1003D)	100kΩ,±0.5%,1/4W	
R166	MF,(RN14K2E4992D)	49.9kΩ,±0.5%,1/4W	
R167	MF,(RN14K2E4992D)	49.9kΩ,±0.5%,1/4W	
R168	MF,(RN14K2E1003D)	100kΩ,±0.5%,1/4W	
R169	Var,MF,(RJ-6S 10kΩ)	10kΩ,1/2W	
R170	Not assigned		
R171	Var,MF,(RJ-6P 100kΩ)	100kΩ,1/2W	
R172	Var,MF,(RJ-6P 100kΩ)	100kΩ,1/2W	
R173	Var,MF,(RJ-6P 100kΩ)	100kΩ,1/2W	
R174	CF,(ARD25T104J)	100kΩ,±5%,1/4W	
R175	CF,(ARD25T104J)	100kΩ,±5%,1/4W	
R176	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W	
R177	Not assigned		
R178	CF,(ARD25T683J)	68kΩ,±5%,1/4W	
R179	CF,(ARD25T683J)	68kΩ,±5%,1/4W	
R180	Not assigned		
R181	Not assigned		
R182	Not assigned		
R183	Not assigned		
R184	CF,(ARD25T105J)	1MΩ,±5%,1/4W	
R185	Var,MF,(RJ-6S 100kΩ)	100kΩ,1/2W	
R186	CF,(ARD25T105J)	1MΩ,±5%,1/4W	
R187	Var,MF,(RJ-6S 100kΩ)	100kΩ,1/2W	

( ): Manufacturer's part number
* : Selected at factory

Table 6-14 COMPONENT LIST OF PHASE DETECTOR (Z2)

CKT REF	DESCRIPTION	RATING	NOTE
C 1	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V	
C 2	Elect,(CE04W1V220)	22μF,±20%,35V	
C 3	Elect,(CE04W1V220)	22μF,±20%,35V	
C 4	Elect,(CE04W1J010)	1μF,±20%,63V	
C 5	Plast,(ECQ-P1 332FZ)	3300pF,±1%,100V	
C 6	Plast,(ECQ-P1 332FZ)	3300pF,±1%,100V	
C 7	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V	
C 8	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V	
C 9	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V	
C10	Cer,(CC924CH1H100D)	10pF,±0.5%,50V	
C11	Elect,(CE04W1V220)	22μF,±20%,35V	
C12	Elect,(CE04W1V220)	22μF,±20%,35V	
C13	Elect,(CE04W1V220)	22μF,±20%,35V	
C14	Elect,(CE04W1V220)	22μF,±20%,35V	
C15	Cer,(RPE111CH911G50)	910pF,±2%,50V	
C16	Elect,(CE04W1V220)	22μF,±20%,35V	
C17	Elect,(CE04W1V220)	22μF,±20%,35V	
C18	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V	
C19	Elect,(CE04W1V220)	22μF,±20%,35V	
C20	Not assigned		
C21	Elect,(CE04W1V220)	22μF,±20%,35V	
C22	Not assigned		
C23	Tant,(CS02H1C3R3M)	3.3μF,±20%,16V	
C24	Elect,(CE04W1V100)	10μF,±20%,35V	
C25	Plast,(ECQ-M1H222KZ)	2200pF,±10%,50V	
C26	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V	
C27	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V	
C28	Cer,(RPE111CH431G50)	430pF,±2%,50V	
C29	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V	
C30	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V	
C31	Elect,(CE04W1A470)	47μF,±20%,10V	
C32	Elect,(CE04W1A470)	47μF,±20%,10V	
C33	Elect,(CE04W1E221)	220μF,±20%,25V	
C34	Elect,(CE04W1V220)	22μF,±20%,35V	
C35	Plast,(ECQ-M1H223KZ)	0.022μF,±10%,50V	
C36	Plast,(ECQ-M1H223KZ)	0.022μF,±10%,50V	
C37	Plast,(ECQ-M1H104KZ)	0.1μF,±10%,50V	
C38	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V	
C39	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V	
C40	Elect,(CE04W1V100)	10μF,±20%,35V	
C41	Elect,(CE04W1V220)	22μF,±20%,35V	
C42	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V	
C43	Elect,(CE04W1J010)	1μF,±20%,63V	
C44	Elect,(CE04W1J010)	1μF,±20%,63V	
C45	Plast,(ECQ-M1H104KZ)	0.1μF,±10%,50V	

( ): Manufacturer's part number
* : Selected at factory

Table 6-14 COMPONENT LIST OF PHASE DETECTOR (Z2)

CKT REF	DESCRIPTION	RATING	NOTE
C46	Plast,(ECQ-M1H224KZ)	0.22μF,±10%,50V	
C47	Tant,(CS02H1C151M)	150μF,±20%,50V	
C48	Cer,(CC924CH1H680J)	68pF,±5%,50V	Q'ty 0 or 1,*
C49	Cer,(CC924CH1H471J)	470pF,±5%,50V	Q'ty 0 or 1,*
C50	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V	
C51	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V	
C52	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V	
C53	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V	
C54	Plast,(ECQ-M1H102KZ)	1000pF,±10%,50V	Q'ty 0 or 1,*
C55	Plast,(ECQ-M1H104KZ)	0.1μF,±10%,50V	
C56	Elect,(CE04W1V220)	22μF,±20%,35V	
C57	Elect,(CE04W1V220)	22μF,±20%,35V	
C58	Plast,(ECQ-M1H473KZ)	0.047μ,±10%,50V	
C59	Elect,(CE04W1V100)	10μF,±20%,35V	
C60	Elect,(CE04W1V220)	22μF,±20%,35V	
C61	Elect,(CE04W1V220)	22μF,±20%,35V	
C62	Elect,(CE04W1V220)	22μF,±20%,35V	
C63	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V	
C64	Var,Cer,(TZ03R200A)	4 to 20pF,100V	
C65	Cer,(CC924CH1H360J)	36pF,±5%,50V	
C66	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V	
C67	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V	
C68	Elect,(CE04W1V220)	22μF,±20%,35V	
C69	Elect,(CE04W1V220)	22μF,±20%,35V	
C70	Cer,(CK924C1H473M)	0.047μF,±20%,50V	
C71	Elect,(CE04W1V220)	22μF,±20%,35V	
C72	Cer,(CK924C1H104M)	0.1μF,±20%,50V	
C73	Elect,(CE04W1V220)	22μF,±20%,35V	
C74	Not assigned		
C75	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V	
C76	Plast,(ECQ-P1 822FZ)	8200pF,±1%,100V	
C77	Plast,(ECQ-P1 302FZ)	3000pF,±1%,100V	
C78	Plast,(ECQ-P1 152FZ)	1500pF,±1%,100V	
C79	Cer,(CC924CH1H331J)	330pF,±5%,50V	
C80	Elect,(CE04W1A470)	47μF,±20%,10V	
C81	Cer,(CC924CH1H151J)	150pF,±5%,50V	
C82	Cer,(CC924CH1H151J)	150pF,±5%,50V	
C83	Cer,(CC924CH1H820J)	82pF,±5%,50V	
C84	Cer,(CC924CH1H680J)	68pF,±5%,50V	
C85	Cer,(CC924CH1H330J)	33pF,±5%,50V	
C86	Cer,(CK924C1H104M)	0.1μF,±20%,50V	
C87	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V	
C88	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V	
C89	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V	
C90	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V	

( ): Manufacturer's part number
* : Selected at factory

Table 6-14 COMPONENT LIST OF PHASE DETECTOR (Z2)

CKT REF	DESCRIPTION	RATING		NOTE
C91	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V		
C92	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V		
C93	Plast,(ECQ0M1H103KZ)	0.01μF,±10%,50V		
C94	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V		
C95	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V		
C96	Not assigned			
C97	Elect,(CE04W1E221)	220μF,±20%,25V		
C98	Elect,(CE04W1V220)	22μF,±20%,35V		
C99	Elect,(CE04W1V220)	22μF,±20%,35V		
C100	Elect,(CE04W1E221)	220μF,±20%,25V		
C101	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C102	Plast,(ECQ-M1H104KZ)	0.1μF,±10%,50V		
C103	Plast,(ECQ-M1H104KZ)	0.1μF,±10%,50V		
C104	Cer,(CC924CH1H050D)	5pF,±0.5pF,50V		
C105	Plast,(ECQ-M1H104KZ)	0.1μF,±10%,50V		
C106	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		
C107	Cer,(CC924CH1H270J)	27pF,±5%,50V		
C108	Cer,(CC924CH1H470J)	47pF,±5%,50V		
C109	Cer,(CC924CH1H470J)	47pF,±5%,50V		
C110	Elect,(CE04W1V220)	22μF,±20%,35V		
C111	Elect,(CE04W1V220)	22μF,±20%,35V		
C112	Plast,(ECQ-M1H473KZ)	0.047μF,±20%,50V		
C113	Not assigned			
C114	Elect,(CE04W1V220)	22μF,±20%,35V		
C115	Elect,(CE04W1V220)	22μF,±20%,35V		
C116	Elect,(CE04W1V220)	22μF,±20%,35V		
C117	Elect,(CE04W1V220)	22μF,±20%,35V		
C118	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V		
C119	Elect,(CE04W1V220)	22μF,±20%,35V		
C120	Elect,(CE04W1V220)	22μF,±20%,35V		
C121	Elect,(CE04W1V220)	22μF,±20%,35V		
C122	Elect,(CE04W1V220)	22μF,±20%,35V		
C123	Plast,(ECQ-M1H102KZ)	1000pF,±10%,50V		
C124	Plast,(ECQ-M1H102KZ)	1000pF,±10%,50V		
C125	Plast,(ECQ-M1H102KZ)	1000pF,±10%,50V		
C126	Plast,(ECQ-M1H102KZ)	1000pF,±10%,50V		
C127	Elect,(CE04W1V220)	22μF,±20%,35V		
C128	Elect,(CE04W1V220)	22μF,±20%,35V		
C129	Elect,(CE04W1V220)	22μF,±20%,35V		
C130	Elect,(CE04W1V220)	22μF,±20%,35V		
C131	Plast,(ECQ-M1H104KZ)	0.1μF,±10%,50V		
C132	Cer,(RPE111CH301G50)	300pF,±2%,50V		
C133	Cer,(CC924CH1H331J)	330pF,±5%,50V		
C134	Elect,(CE04W1V220)	22μF,±20%,35V		
C135	Elect,(CE04W1V220)	22μF,±20%,35V		

( ): Manufacturer's part number
* : Selected at factory

Table 6-14 COMPONENT LIST OF PHASE DETECTOR (Z2)

CKT REF	DESCRIPTION	RATING		NOTE
C136	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V		
C137	Not assigned			
C138	Elect,(CE04W1V220)	22μF,±20%,35V		
C139	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C140	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C141	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C142	Elect,(CE04W1V100)	10μF,±20%,35V		
C143	Elect,(CE04W1V220)	22μF,±20%,35V		
C144	Plast,(ECQ-M1H104KZ)	0.1μF,±10%,50V		
C145	Plast,(ECQ-P1 302FZ)	3000pF,±1%,100V		
C146	Plast,(ECQ-P1 302FZ)	3000pF,±1%,100V		
C147	Not assigned			
C148	Not assigned			
C149	Plast,(ECQ-P1 302FZ)	3000pF,±1%,100V		
C150	Elect,(CE04W1V220)	22μF,±20%,35V		
C151	Elect,(CE04W1V220)	22μF,±20%,35V		
C152	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C153	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C154	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C155	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C156	Plast,(ECQ-P1 163FZ)	0.016μF,±1%,100V		
C157	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C158	Elect,(CE04W1J010)	1μF,±20%,63V		
C159	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C160	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C161	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
L 1	Coil,(LV2-221)	245μH		
L 2	Coil,(LV2-221)	245μH		
L 3	Coil,(LV1-220)	18μH		
L 4	Coil,(LF8-221K)	220μH		
L 5	Coil,(LF8-221K)	220μH		
L 6	Not assigned			
L 7	Coil,(LF8-221K)	220μH		
L 8	Coil,(LF8-221K)	220μH		
L 9	Coil,(FS0810-102K)	1mH		
L10	Not assigned			
L11	Coil,(LV1-101)			
L12	Coil,(LV1-101)			
L13	Coil,(LV3-102)			
L14	Coil,(LH1-332K)	3.3mH		
L15	Coil,(FS0810-471K)	470μH		
L16	Coil,(LF8-221K)	220μH		
L17	Coil,(LH1-222K)	2.2mH		

( ): Manufacturer's part number
* : Selected at factory

Table 6-14 COMPONENT LIST OF PHASE DETECTOR (Z2)

CKT REF	DESCRIPTION	RATING		NOTE
L18	Coil,(LV2-*)	100 to 330μH		*
L19	Coil,(LV1-*)	100 to 330μH		*
L20	Coil,(LV1-101)	100μH		
L21	Coil,(LF8-221K)	220μH		
L22	Coil,(LF8-221K)	220μH		
L23	Coil,(LF8-220K)	22μH		
L24	Not assigned			
L25	Coil,(LF8-221K)	220μH		
L26	Not assigned			
L27	Not assigned			
L28	Coil,(LV2-681)	680μH		
L29	Coil,(LV2-221)	22μH		
L30	Not assigned			
L31	Coil,(LV2-101)	100μH		
L32	Coil,(LV1-150)	15μH		
L33	Coil,(LV1-100)	10μH		
L34	Coil,(LV1-6R8)	6.8μH		
L35	Coil,(LV1-6R8)	6.8μH		
L36	Coil,(LV1-4R7)	4.7μH		
L37	Coil,(LV1-3R3)	3.3μH		
L38	Not assigned			
L39	Not assigned			
L40	Not assigned			
L41	Coil,(LF8-220K)	22μH		
L42	Coil,(LH1-102K)	1mH		
L43	Coil,(LH1-102K)	1mH		
L44	Coil,(LH1-102K)	1mH		
L45	Coil,(LH1-102K)	1mH		
L46	Coil,(LH1-102K)	1mH		
L47	Coil,(LH1-102K)	1mH		
L48	Coil,(LH1-102K)	1mH		
L49	Coil,(LH1-102K)	1mH		
L50	Not assigned			
L51	Coil,(LF8-221K)	220μH		
L52	Coil,(LF8-221K)	220μH		
L53	Coil,(LF8-221K)	220μH		
L54	Coil,(LF8-221K)	220μH		
L55	Coil,(LF8-220K)	22μH		
L56	Coil,(FS0810-471K)	470μH		
L57	Coil,(FS1012-152K)	1.5mH		
Q 1	Tr,(2SC2901)			
Q 2	IC,(TC4053BP)			
Q 3	IC,(μA733CN)			
Q 4	Tr,(2SC2718)			
Q 5	Tr,(2SC2718)			

( ): Manufacturer's part number
* : Selected at factory

Tabel 6-14 COMPONENT LIST OF PHASE DETECTOR (Z2)

CKT REF	DESCRIPTION	RATING		NOTE
Q 6	Tr,(2SC2718)			
Q 7	Di,(1S953)			
Q 8	Di,(1S953)			
Q19	FET,(2SK12)			
Q10	Not assigned			
Q11	IC,(74LS00)			
Q12	IC,(μPC251C)			
Q13	Tr,(2SC2718)			
Q14	Tr,(2SC2718)			
Q15	Tr,(2SC2718)			
Q16	Not assigned			
Q17	IC,(74LS00)			
Q18	IC,(74LS74A)			
Q19	IC,(74LS74A)			
Q20	Not assigned			
Q21	Tr,(2SC2718)			
Q22	Tr,(2SC2718)			
Q23	Tr,(2SC2718)			
Q24	Tr,(2SC2718)			
Q25	Tr,(2SC2718)			
Q26	Tr,(2SC2718)			
Q27	Tr,(2SC2718)			
Q28	Tr,(2SC2718)			
Q29	IC,(74LS10)			
Q30	Not assigned			
Q31	Tr,(2SC2718)			
Q32	Tr,(2SC2718)			
Q33	IC,(μPC251C)			
Q34	Di,(2S953)			
Q35	Tr,(2SC2718)			
Q36	Di,(1S953)			
Q37	Tr,(2SC2718)			
Q38	IC,(μPC251C)			
Q39	IC,(μTC4053BP)			
Q40	Di,(1S953)			
Q41	Di,breakdown,(RD3.9EB)	3.7 to 4.1V,400mW		
Q42	Di,(1S953)			
Q43	Tr,(2SC2718)			
Q44	Di,breakdown,(RD3.9EB)	3.7 to 4.1V,400mW		
Q45	Di,(1S953)			
Q46	IC,(μPC251C)			
Q47	Not assigned			
Q48	Tr,(2SC2901)			
Q49	Tr,(2SC2901)			
Q50	Tr,(2SC2901)			

( ): Manufacturer's part number
* : Selected at factory

Tabel 6-14 COMPONENT LIST OF PHASE DETECTOR (Z2)

CKT REF	DESCRIPTION	RATING		NOTE
Q51	Di,(FC52M)			
Q52	Not assigned			
Q53	IC,(74LS90)			
Q54	IC,(74LS90)			
Q55	IC,(74LS92)			
Q56	IC,(74LS92)			
Q57	IC,(74LS93)			
Q58	IC,(74LS90)			
Q59	IC,(74LS151)			
Q60	Di,(1S953)			
Q61	Tr,(2SC2718)			
Q62	Not assigned			
Q63	Tr,(2SC2718)			
Q64	Tr,(2SC2718)			
Q65	Tr,(2SC2901)			
Q66	Tr,(2SC2901)			
Q67	Tr,(2SC1252)			
Q68	Di,(1S953)			
Q69	Di,(1S953)			
Q70	Di,(1S953)			
Q71	Di,(1S953)			
Q72	Di,(1S953)			
Q73	Di,(1S953)			
Q74	Di,(1S953)			
Q75	Di,(1S953)			
Q76	Di,(1S953)			
Q77	IC,(μPA67C)			
Q78	IC,(μPA67C)			
Q79	Tr,(2SC2718)			
Q80	Di,(1S953)			
Q81	IC,(74LS04)			
Q82	IC,(74LS04)			
Q83	IC,(74LS10)			
Q84	IC,(7406)			
Q85	Not assigned			
Q86	Di,(1S953)			
Q87	Di,breakdown,(RD13EB)	12.4 to 14.1V,400mW		
Q88	IC,(74LS147)			
Q89	Not assigned			
Q90	Not assigned			
Q91	Tr,(2SC2901)			
Q92	Tr,(2SC2901)			
Q93	Di,(FC52M)			
Q94	Di,(1S953)			
Q95	Di,(1S953)			

( ): Manufacturer's part number
* : Selected at factory

Table 6-14 COMPONENT LIST OF PHASE DETECTOR (Z2)

CKT REF	DESCRIPTION	RATING		NOTE
Q96	Di,(1S953)			
Q97	Tr,(2SC2901)			
Q98	Tr,(2SC2901)			
Q99	Di,(FC52M)			
Q100	Not assigned			
Q101	Di,(1S953)			
Q102	Di,(1S953)			
Q103	Di,(1S953)			
Q104	Tr,(2SC2901)			
Q105	Tr,(2SC2901)			
Q106	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q107	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q108	IC,(μPC1[illegible]305H)			
Q109	Di,(1S953)			
Q110	IC(μPC151C)			
Q111	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q112	Tr,(2SC2901)			
Q113	Tr,(2SC2901)			
Q114	Tr,(2SC1252)			
Q115	Di,(1S953)			
Q116	Di,(1S953)			
Q117	Tr,(2SC2718)			
Q118	Tr,(2SC2718)			
Q119	Not assigned			
Q120	Not assigned			
Q121	Not assigned			
Q122	Not assigned			
Q123	Tr,(2SC2718)			
Q124	Di,(1S953)			
Q125	Di,(1S953)			
Q126	IC,(μPC151C)			
Q127	IC,(74LS00)			
Q128	Tr,(2SC2718)			
Q129	Tr,(2SC2718)			
Q130	Tr,(2SC2718)			
Q131	Tr,(2SC2718)			
R 1	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R 2	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R 3	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R 4	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R 5	CF,(ARD25T560J)	56Ω,±5%,1/4W		
R 6	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R 7	CF,(ARD25T221J)	220Ω,±5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-14 COMPONENT LIST OF PHASE DETECTOR (Z2)

CKT REF	DESCRIPTION	RATING		NOTE
R 8	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R 9	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R10	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R11	Not assigned			
R12	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R13	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R14	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R15	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R16	MF,(RN14K2E11R0D)	11Ω,±0.5%,1/4W		
R17	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R18	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R19	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R20	Not assigned			
R21	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R22	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R23	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R24	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R25	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R26	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R27	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R28	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R29	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R30	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R31	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R32	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R33	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R34	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R35	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R36	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R37	CF,(ARD25T682J)	6.8kΩ,±5%,1/4W		
R38	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R39	CF,(ARD25T561J)	560Ω,±5%,1/4W		
R40	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R41	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R42	CF,(ARD25T601J)	600Ω,±5%,1/4W		
R43	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R44	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R45	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R46	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R47	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R48	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R49	Not assigned			
R50	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R51	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R52	CF,(ARD25T681J)	680Ω,±5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-14 COMPONENT LIST OF PHASE DETECTOR (Z2)

CKT REF	DESCRIPTION	RATING		NOTE
R53	CF,(ARD25T122J)	1.2kΩ,±5%,1/4W		
R54	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R55	Not assigned			
R56	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R57	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R58	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R59	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R60	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R61	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R62	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R63	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R64	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R65	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R66	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R67	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R68	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R69	Var,MF,(RJ-6S 5kΩ)	5kΩ,1/2W		
R70	Var,MF,(RJ-6S 5kΩ)	5kΩ,1/2W		
R71	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R72	CF,(ARD25T562J)	5.6kΩ,±5%,1/4W		
R73	CF,(ARD25T393J)	39kΩ,±5%,1/4W		
R74	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R75	CF,(ARD25T224J)	220kΩ,±5%,1/4W		
R76	CF,(ARD25T474J)	470kΩ,±5%,1/4W		
R77	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R78	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R79	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R80	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R81	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R82	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R83	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R84	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R85	CF,(ARD25T271J)	270Ω,±5%,1/4W		
R86	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R87	CF,(ARD25T683J)	68kΩ,±5%,1/4W		
R88	CF,(ARD25T473J)	47kΩ,±5%,1/4W		
R89	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R90	CF,(ARD25T154J)	150kΩ,±5%,1/4W		
R91	CF,(ARD25T333J)	33kΩ,±5%,1/4W		
R92	CF,(ARD25T392J)	3.9kΩ,±5%,1/4W		
R93	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R94	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R95	CF,(ARD25T272J)	2.7kΩ,±5%,1/4W		
R96	CF,(ARD25T561J)	560Ω,±5%,1/4W		
R97	CF,(ARD25T561J)	560Ω,±5%,1/4W		
R98	CF,(ARD25T101J)	100Ω,±5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-14 COMPONENT LIST OF PHASE DETECTOR (Z2)

CKT REF	DESCRIPTION	RATING		NOTE
R 99	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R100	Not assigned			
R101	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R102	Not assigned			
R103	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R104	CF,(ARD25T154J)	150kΩ,±5%,1/4W		
R105	CF,(ARD25T561J)	560Ω,±5%,1/4W		
R106	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R107	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R108	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R109	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R110	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R111	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R112	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R113	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R114	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R115	Not assigned			
R116	Not assigned			
R117	Not assigned			
R118	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R119	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R120	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R121	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R122	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R123	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R124	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R125	MF,(RN14K2H331J)	330Ω,±5%,1/4W		
R126	Single in-line array, (IHR-10-332JA)	3.3kΩ x 10,1/8W		
R127	Not assigned			
R128	Not assigned			
R129	Not assigned			
R130	Not assigned			
R131	Not assigned			
R132	Not assigned			
R133	Not assigned			
R134	Not assigned			
R135	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R136	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R137	Not assigned			
R138	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R139	Not assigned			
R140	Not assigned			
R141	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R142	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R143	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-14 COMPONENT LIST OF PHASE DETECTOR (Z2)

CKT REF	DESCRIPTION	RATING		NOTE
R144	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R145	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R146	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R147	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R148	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R149	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R150	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R151	Not assigned			
R152	CF,(ARD25T182J)	1.8kΩ,±5%,1/4W		
R153	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R154	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R155	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R156	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R157	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R158	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R159	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R160	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R161	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R162	CF,(ARD25T182J)	1.8kΩ,±5%,1/4W		
R163	Not assigned			
R164	CF,(ARD25T682J)	6.8kΩ,±5%,1/4W		
R165	CF,(ARD25T682J)	6.8kΩ,±5%,1/4W		
R166	CF,(ARD25T333J)	33kΩ,±5%,1/4W		
R167	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R168	CF,(ARD25T102J)	100Ω,±5%,1/4W		
R169	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R170	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R171	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R172	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R173	CF,(ARD25T181J)	180Ω,±5%,1/4W		
R174	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R175	CF,(ARD25T181J)	180Ω,±5%,1/4W		
R176	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R177	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R178	CF,(RN14K2H220J)	22Ω,±5%,1/2W		
R179	Single in-line array, (IHR-6-103JA)	10kΩ x 6,1/8W		
R180	Not assigned			
R181	Not assigned			
R182	Not assigned			
R183	Not assigned			
R184	Not assigned			
R185	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R186	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R187	CF,(ARD25T473J)	47kΩ,±5%,1/4W		
R188	CF,(ARD25T102J)	1kΩ,±5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-14 COMPONENT LIST OF PHASE DETECTOR (Z2)

CKT REF	DESCRIPTION	RATING		NOTE
R189	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R190	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R191	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R192	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R193	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R194	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R195	MF,(RN14K2H331J)	330Ω,±5%,1/2W		
R196	CF,(ARD25T683J)	68kΩ,±5%,1/4W		
R197	CF,(ARD25T683J)	68kΩ,±5%,1/4W		
R198	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R199				
R200	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R201	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R202	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R203	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R204	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R205	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R206	CF,(ARD25T561J)	560Ω,±5%,1/4W		
R207	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R208	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R209	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R210	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R211	CF,(ARD25T221)	220Ω,±5%,1/4W		
R212	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R213	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R214	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R215	Not assigned			
R216	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R217	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R218	Not assigned			
R219	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R220	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R221	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R222	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R223	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R224	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R225	CF,(ARD25T272J)	2.7kΩ,±5%,1/4W		
R226	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R227	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R228	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R229	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R230	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R231	CF,(ARD25T471J)	470Ω,±5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-14 COMPONENT LIST OF PHASE DETECTOR (Z2)

CKT REF	DESCRIPTION	RATING		NOTE
S 1	Switch,(DIP-A(4))			
X 1	XTAL OSC,(44x64089A)	1722.222kHz		K type
	XTAL OSC,(44x64089C)	2122.222kHz		L type
	XTAL OSC,(44x64089C)	2122.222kHz		M type
X 2	XTAL OSC,(44x64089E)	3302.222kHz		
X 3	XTAL OSC,(44x64089G)	4152.222kHz		
X 4	XTAL OSC,(44x64089J)	5322.222kHz		
X 5	XTAL OSC,(44x64089L)	7922.222kHz		
X 6	XTAL OSC,(44x64089N)	12112.222kHz		ME538K/L/M
X 7	XTAL OSC,(44x64090)	20MHz		
Z 1	MIXER,(R&K M1(8 pins))			

( ): Manufacturer's part number
* : Selected at factory

Table 6-15 COMPONENT LIST OF BB DETECTOR (Z3)

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer,(CK924C1H473M)	0.047μF,±20%,50V		
C 2	Cer,(CK924C1H473M)	0.047μF,±20%,50V		
C 3	Elect,(CE04W1V220)	22μF,±20%,35V		
C 4	Plast,(ECQ-M1H224KZ)	0.22μF,±10%,50V		
C 5	Cer,(CK924C1H104M)	0.1μF,±20%,50V		Q'ty 2, Parallel
C 6	Cer,(CC924CH1H101J)	100pF,±5%,50V		
C 7	Not assigned			
C 8	Cer,(RPE111CH201G50)	200pF,±2%,50V		
C 9	Cer,(CC924CH1H090D)	9pF,±0.5pF,50V		
C10	Cer,(CC924CH1H101J)	100pF,±5%,50V		
C11	Not assigned			
C12	Not assigned			
C13	Not assigned			
C14	Tant,(CS02H1C3R3M)	3.3μF,±20%,16V		
C15	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C16	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C17	Tant,(CS02H1C3R3M)	3.3μF,±20%,16V		
C18	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C19	Elect,(CE04W1V220)	22μF,±20%,35V		
C20	Elect,(CE04W1V100)	10μF,±20%,35V		
C21	Elect,(CE04W1V220)	22μF,±20%,35V		
C22	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C23	Tant,(CS02H1C3R3M)	3.3μF,±20%,16V		
C24	Cer,(CK924C1H473M)	0.047μF,±20%,50V		
C25	Cer,(CC924CH1H100D)	10pF,±0.5%,50V		
C26	Tant,(CS02H1C3R3M)	3.3μF,±20%,16V		
C27	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V		
C28	Plast,(ECQ-P1 273FZ)	0.027μF,±1%,100V		
C29	Cer,(CK924C1H223M)	0.022μF,±20%,50V		
C30	Cer,(CK924C1H223M)	0.022μF,±20%,50V		
C31	Cer,(RPE114C105M50V)	1μF, 20%,50V		
C32	Plast,(ECQ P-1 * FZ)	1800pF to 2400pF, ±1%,100V		*
C33	Elect,(CE04W1V220)	22μF,±20%,35V		
C34	Elect,(CE04W1V220)	22μF,±20%,35V		
C35	Elect,(CE04W1V220)	22μF,±20%,35V		
C36	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		
C37	Not assigned			
C38	Cer,(CK924C1H104M)	0.1μF,±20%,50V		Q'ty 0 or 1, *
C39	Cer,(CK924C1H104M)	0.1μF,±20%,50V		Q'ty 0 or 1, *
C40	Plast,(ECQ-M1H222KZ)	2200pF,±10%,50V		
C41	Plast,(ECQ-M1H222KZ)	2200pF,±10%,50V		
C42	Elect,(CE04W1V220)	22μF,±20%,35V		

( ): Manufacturer's part number

* : Selected at factory

Table 6-15 COMPONENT LIST OF BB DETECTOR (Z3)

CKT REF	DESCRIPTION	RATING		NOTE
C43	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C44	Not assigned			
C45	Elect,(CE04W1V220)	22μF,±20%,35V		
C46	Elect,(CE04W1V220)	22μF,±20%,35V		
C47	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C48	Elect,(CE04W1V220)	22μF,±20%,35V		
C49	Cer,(CC924CH1H101J)	100pF,±5%,50V		
C50	Elect,(CE04W1V220)	22μF,±20%,35V		
C51	Elect,(CE04W1V220)	22μF,±20%,35V		
C52	Plast,(ECQ-M1H223KZ)	0.022μF,±10%,50V		
C53	Cer,(CK924C1H473M)	0.047μF,±20%,50V		
C54	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C55	Plast,(ECQ-M1H223KZ)	0.022μF,±10%,50V		
C56	Cer,(CC924CH1H680J)	68pF,±5%,50V		
C57	Cer,(CC924CH1H680J)	68pF,±5%,50V		
C58	Cer,(CK924C1H473M)	0.047μF,±20%,50V		
C59	Not assigned			
C60	Cer,(CC924CH1H330J)	33pF,±5%,50V		
C61	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		
C62	Cer,(CC924CH1H330J)	33pF,±5%,50V		
C63	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		
C64	Cer,(CC924CH1H101J)	100pF,±5%,50V		
C65	Plast,(ECQ-M1H102KZ)	1000pF,±10%,50V		
C66	Cer,(CC924CH1H331J)	330pF,±5%,50V		
C67	Plast,(ECQ-M1H102KZ)	1000pF,±10%,50V		
C68	Plast,(ECQ-M1H102KZ)	1000pF,±10%,50V		
C69	Plast,(ECQ-P1 332FZ)	3300pF,±1%,100V		
C70	Plast,(ECQ-M1H222KZ)	2200pF,±10%,50V		
C71	Plast,(ECQ-M1H102KZ)	1000pF,±10%,50V		
C72	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		
C73	Plast,(ECQ-M1H102KZ)	1000pF,±10%,50V		
C74	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		
C75	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V		
C76	Cer,(CK924C1H104M)	0.1μF,±20%,50V		Q'ty 0 or 1, *
C77	Elect,(CE04W1J010)	1μF,±20%,63V		
C78	Cer,(CC924CH1H151J)	150pF,±5%,50V		
C79	Cer,(CC924CH1H221J)	220pF,±5%,50V		
C80	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		
C81	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		
C82	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		
C83	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		
C84	Elect,(CE04W1V220)	22μF,±20%,35V		
C85	Elect,(CE04W1V220)	22μF,±20%,35V		

( ): Manufacturer's part number

* : Selected at factory

Table 6-15 COMPONENT LIST OF BB DETECTOR (Z3)

CKT REF	DESCRIPTION	RATING		NOTE
C86	Elect,(CE04W1V220)	22μF,±20%,35V		
C87	Elect,(CE04W1V220)	22μF,±20%,35V		
C88	Cer,(CC924CH1H470J)	47pF,±5%,50V		
C89	Cer,(CC924CH1H331J)	330pF,±5%,50V		
C90	Cer,(CC924CH1H680J)	68pF,±5%,50V		
C91	Cer,(CC924CH1H221J)	220pF,±5%,50V		
C92	Cer,(CC924CH1H220J)	22pF,±5%,50V		
C93	Tant,(CS02H1C3R3M)	3.3μF,±20%,16V		
C94	Tant,(CS02H1C3R3M)	3.3μF,±20%,16V		
C95	Elect,(CE04W1V220)	22μF,±20%,35V		
C96	Elect,(CE04W1V220)	22μF,±20%,35V		
C97	Cer,(CK924C1H473M)	0.047μF,±20%,50V		
C98	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C99	Elect,(CE04W1J2R2)	2.2μF,±20%,63V		
C100	Elect,(CE04W1J2R2)	2.2μF,±20%,63V		
C101	Elect,(CE04W1E101)	100μF,±20%,25V		
C102	Elect,(CE04W1J010)	1μF,±20%,63V		
C103	Elect,(CE04W1J2R2)	2.2μF,±20%,63V		
C104	Elect,(CE04W1E101)	100μF,±20%,25V		
C105	Elect,(CE04W1V220)	22μF,±20%,35V		
C106	Elect,(CE04W1V220)	22μF,±20%,35V		
C107	Cer,(CK924C1H473M)	0.047μF,±20%,50V		
C108	Cer,(CK924C1H473M)	0.047μF,±20%,50V		
C109	Plast,(ECQ-M1H223KZ)	0.022μF,±10%,50V		
C110	Cer,(CC924CH1H471J)	470pF,±5%,50V		
C111	Plast,(ECQ-M1H333KZ)	0.033μF,±10%,50V		
C112	Cer,(CK924C1H473M)	0.047μF,±20%,50V		
C113	Plast,(ECQ-M1H223KZ)	0.022μF,±10%,50V		
C114	Cer,(CC924CH1H471J)	470pF,±5%,50V		
C115	Elect,(CE04W1J010)	1μF,±20%,63V		
C116	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C117	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C118	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C119	Cer,(CC924CH1H470J)	47pF,±5%,50V		
C120	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C121	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C122	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C123	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C124	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C125	Not assigned			
C126	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C127	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C128	Cer,(CK924F1H104Z)	0.1μF,+80%/-20%,50V		
C129	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C130	Cer,(CK924C1H104M)	0.1μF,±20%,50V		

( ): Manufacturer's part number

* : Selected at factory

Table 6-15 COMPONENT LIST OF BB DETECTOR (Z3)

CKT REF	DESCRIPTION	RATING		NOTE
C131	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C132	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C133	Tant,(CS02H1C3R3M)	3.3μF,±20%,16V		
C134	Elect,(CE04W1J010)	1μF,±20%,63V		
C135	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C136	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C137	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C138	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C139	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C140	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C141	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C142	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C143	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C144	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C145	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C146	Elect,(CE04W1J4R7)	4.7μF,±20%,63V		
C147	Cer,(CC924CH1H101J)	100pF,±5%,50V		
C148	Cer,(CC924CH1H070D)	7pF,±0.5pF,50V		
C149	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C150	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C151	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C152	Cer,(CC924CH1H330J)	33pF,±5%,50V		
C153	Cer,(CC924CH1H181J)	180pF,±5%,50V		
C154	Cer,(CC924CH1H330J)	33pF,±5%,50V		
C155	Cer,(CC924C1H472M)	4700pF,±20%,50V		
C156	Cer,(CC924C1H472M)	4700pF,±20%,50V		
C157	Cer,(CC924C1H472M)	4700pF,±20%,50V		
C158	Cer,(CC924C1H472M)	4700pF,±20%,50V		
C159	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C160	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C161	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C162	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C163	Cer,(CC45CH1H*DY)	4 to 10pF,±0.5pF,50V		*
J 1	Pattern			
J 2	Receptacle,(BNC-R-NI)			
J 3	Connector,(PI021-2M)			
J 4	Receptacle, (27DP-LR-PC)			
J 5	Plug,(27DP-P-1.5)			
K 1	Relay,(NRS-12V)			
K 2	Relay,(MR62-12S)			
K 3	Relay,(MR62-12S)			
K 4	Relay,(MR62-12S)			
K 5	Relay,(MR62-12S)			

( ): Manufacturer's part number

* : Selected at factory

Table 6-15 COMPONENT LIST OF BB DETECTOR (Z3)

CKT REF	DESCRIPTION	RATING		NOTE
K 6	Relay,(MR62-12S)			
K 7	Relay,(MR62-12S)			
K 8	Relay,(MR62-12S)			
K 9	Relay,(MR62-12S)			
K10	Relay,(MR62-12S)			
L 1	Coil,(LF8-221K)	220μH		
L 2	Not assigned			
L 3	Not assigned			
L 4	Not assigned			
L 5	Coil,(FS1215-333K)	33mH		
L 6	Coil,(FS1012-332K)	3.3mH		
L 7	Coil,(FS0810-681K)	680μH		
L 8	Coil,(LF8-220K)	22μH		
L 9	Coil,(FS1012-332K)	3.3mH		
L10	Coil,(LF8-221K)	220μH		
L11	Coil,(LF8-221K)	220μH		
L12	Coil,(LF8-221K)	220μH		
L13	Coil,(LF8-221K)	220μH		
L14	Coil,(LH1-223K)	22mH		
L15	Coil,(LH1-223K)	22mH		
L16	Coil,(LF8-100K)	10μH		
L17	Not assigned			
L18	Coil,(LV1-4R7)			
L19	Coil,(LV1-6R8)			
L20	Coil,(LV1-330)			
L21	Coil,(LV1-680)			
L22	Coil,(LV2-331)			
L23	Coil,(LV2-681)			
L24	Coil,(LV2-152)			
L25	Coil,(LH1-333K)	33mH		
L26	Coil,(LH1-333K)	33mH		
L27	Not assigned			
L28	Coil,(339T20195E)	1μH		
L29	Coil,(339T20195G)	1.5μH		
L30	Coil,(LF8-221K)	220μH		
L31	Coil,(LF8-221K)	220μH		
L32	Coil,(LF8-221K)	220μH		
L33	Coil,(LF8-221K)	220μH		
L34	Coil,(FS0810-102K)	1mH		
L35	Coil,(LV1-010)			
L36	Coil,(LV1-010)			
L37	Coil,(SP-0408-4R7M)	4.7μH		
L38	Coil,(LF8-220K)	22μH		

( ): Manufacturer's part number
* : Selected at factory

Table 6-15 COMPONENT LIST OF BB DETECTOR (Z3)

CKT REF	DESCRIPTION	RATING		NOTE
L39	Coil,(LF8-220K)	22μH		
L40	Coil,(LF8-220K)	22μH		
L41	Coil,(LF8-220K)	22μH		
L42	Coil,(432T22960)	0.4μ to 0.7μH		
L43	Coil,(SP-0408-4R7M)	4.7μH		
Q 1	IC,(μPC151C)			
Q 2	Not assigned			
Q 3	Not assigned			
Q 4	Not assigned			
Q 5	Not assigned			
Q 6	Not assigned			
Q 7	Not assigned			
Q 8	Not assigned			
Q 9	Not assigned			
Q10	Not assigned			
Q11	IC,(TD62003P)			
Q12	IC,(TD62003P)			
Q13	Tr,(2SC1254)			
Q14	Not assigned			
Q15	Tr,(2SC1254)			
Q16	Tr,(2SC1254)			
Q17	Tr,(2SC1254)			
Q18	Tr,(2SC2901)			
Q19	Di,(1SS97)			
Q20	Di,(1SS97)			
Q21	IC,(μPC151C)			
Q22	Not assigned			
Q23	Di,(1SS97)			
Q24	Di,(1SS97)			
Q25	Di,(1SS97)			
Q26	Di,(1SS97)			
Q27	IC,(μPC251C)			
Q28	IC,(μPC251C)			
Q29	Di,(1S953)			
Q30	Tr,(2SC2718)			
Q31	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q32	IC,(μPC251C)			
Q33	Di,(1S953)			
Q34	FET,(3SK28)			
Q35	Tr,(2SC2718)			
Q36	IC,(TC4053BP)			
Q37	Di,(1S953)			
Q38	Not assigned			

( ): Manufacturer's part number
* : Selected at factory

Table 6-15 COMPONENT LIST OF BB DETECTOR (Z3)

CKT REF	DESCRIPTION	RATING		NOTE
Q39	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q40	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q41	Not assigned			
Q42	Not assigned			
Q43	Not assigned			
Q44	Not assigned			
Q45	Not assigned			
Q46	Tr,(2SC2718)			
Q47	Di,(1S953)			
Q48	IC,(UA733CN)			
Q49	Tr,(2SC2901)			
Q50	Not assigned			
Q51	Not assigned			
Q52	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q53	IC,(2SC1254)			
Q54	IC,(74LS73)			
Q55	IC,(HD74121)			
Q56	Tr,(2SA1151)			
Q57	Tr,(2SA1151)			
Q58	Tr,(2SA1151)			
Q59	IC,(μPC251C)			
Q60	IC,(μPC251C)			
Q61	IC,(μPC251C)			
Q62	IC,(μPA39A)			
Q63	IC,(μPC251C)			
Q64	IC,(μPC251C)			
Q65	IC,(μPA35A)			
Q66	Not assigned			
Q67	Not assigned			
Q68	Not assigned			
Q69	Not assigned			
Q70	Di,(1S953)			
Q71	Di,(1S953)			
Q72	Di,(1S953)			
Q73	Di,(1S953)			
Q74	Di,(1S953)			
Q75	Di,(1S953)			
Q76	Di,(1S953)			
Q77	IC,(μPC251C)			
Q78	IC,(TC4053BP)			
Q79	Tr,(2SC1254)			
Q80	Tr,(2SC1254)			
Q81	Not assigned			
Q82	Not assigned			
Q83	IC,(74LS14)			

( ): Manufacturer's part number
* : Selected at factory

Table 6-15 COMPONENT LIST OF BB DETECTOR (Z3)

CKT REF	DESCRIPTION	RATING		NOTE
Q84	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q85	IC,(TC4053BP)			
Q86	IC,(μPC16308H)			
Q87	IC,(μPC14308H)			
Q88	Tr,(2SC2901)			
Q89	IC,(2SC2148)			
Q90	Di,(1S2222)			
Q91	Di,(1S2222)			
Q92	Di,(1S2222)			
Q93	Di,(1SS78)			
Q94	Di,(1SS78)			
Q95	IC,(μPC254A)			
Q96	Di,(1S953)			
Q97	Di,(1S953)			
Q98	Di,(1S953)			
Q99	Di,(1S2222)			
Q100	Di,(1S2222)			
Q101	Di,(1S2222)			
Q102	Di,(1SZ47A)			
Q103	IC,(μPC251C)			
Q104	Di,(1SS97)			
Q105	Di,(FC51M)			
Q106	Tr,(2SC1044)			
Q107	IC,(μPC451C)			
Q108	Di,(1SS97)			
Q109	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
R 1	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R 2	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R 3	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R 4	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R 5	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R 6	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R 7	Not assigned			
R 8	Not assigned			
R 9	Not assigned			
R 10	MF,(RN14K2E2670D)	267Ω,±0.5%,1/4W		
R 11	MF,(RN14K2E2670D)	267Ω,±0.5%,1/4W		
R 12	MF,(NRN1/4C4 45.3ΩD)	45.3Ω,±0.5%,1/4W		
R 13	MF,(NRN1/4C4 1.30kΩF)	1.30kΩ,±1%,1/4W		
R 14	MF,(NRN1/4C4 1.30kΩF)	1.30kΩ,±1%,1/4W		
R 15	MF,(NRN1/4C4 8.66ΩF)	8.66Ω,±1%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-15 COMPONENT LIST OF BB DETECTOR (Z3)

CKT REF	DESCRIPTION	RATING		NOTE
R16	MF,(NRN1/4C4 654ΩD)	654Ω,±0.5%,1/4W		
R17	MF,(NRN1/4C4 654ΩD)	654Ω,±0.5%,1/4W		
R18	MF,(NRN1/4C4 17.4ΩD)	17.4Ω,±0.5%,1/4W		
R19	MF,(RN14K2E3320D)	332Ω,±0.5%,1/4W		
R20	MF,(RN14K2E3320D)	332Ω,±0.5%,1/4W		
R21	MF,(NRN1/4C4 35.7ΩD)	35.7Ω,±0.5%,1/4W		
R22	MF,(RN14K2E1740D)	174Ω,±0.5%,1/4W		
R23	MF,(RN14K2E1740D)	174Ω,±0.5%,1/4W		
R24	MF,(NRN1/4C4 79.3ΩD)	79.3Ω,±0.5%,1/4W		
R25	MF,(NRN1/4C4 103.3ΩD)	103.3Ω,±0.5%,1/4W		
R26	MF,(NRN1/4C4 103.3ΩD)	103.3Ω,±0.5%,1/4W		
R27	MF,(NRN1/4C4 231ΩD)	231Ω,±0.5%,1/4W		
R28	MF,(NRN1/4C4 103.3ΩD)	103.3Ω,±0.5%,1/4W		
R29	MF,(NRN1/4C4 103.3ΩD)	103.3Ω,±0.5%,1/4W		
R30	MF,(NRN1/4C4 231ΩD)	231Ω,±0.5%,1/4W		
R31	MF,(NRN1/4C4 103.3ΩD)	103.3Ω,±0.5%,1/4W		
R32	MF,(NRN1/4C4 103.3ΩD)	103.3Ω,±0.5%,1/4W		
R33	MF,(NRN1/4C4 231ΩD)	231Ω,±0.5%,1/4W		
R34	Not assigned			
R35	Not assigned			
R36	Not assigned			
R37	Not assigned			
R38	Not assigned			
R39	Not assigned			
R40	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R41	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R42	CF,(ARD25T562J)	5.6kΩ,±5%,1/4W		
R43	CF,(ARD25T392J)	3.9kΩ,±5%,1/4W		
R44	MF,(RN14K2E7680D)	768kΩ,±0.5%,1/4W		
R45	MF,(NRN1/4C4 292ΩD)	292Ω,±0.5%,1/4W		
R46	MF,(NRN1/4C4 107.4ΩD)	107.4Ω,±0.5%,1/4W		
R47	Not assigned			
R48	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R49	Not assigned			
R50	Not assigned			
R51	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R52	Not assigned			
R53	CF,(ARD25T561J)	560Ω,±5%,1/4W		
R54	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R55	CF,(ARD25T131J)	130Ω,±5%,1/4W		
R56	Not assigned			
R57	Thermistor,(OSD5-300-1)	300Ω		
R58	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R59	Not assigned			
R60	Not assigned			

( ): Manufacturer's part number
* : Selected at factory

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Table 6-15 COMPONENT LIST OF BB DETECTOR (Z3)

CKT REF	DESCRIPTION	RATING		NOTE
R61	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R62	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R63	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R64	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R65	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R66	Not assigned			
R67	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R68	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R69	CF,(ARD25T392J)	3.9kΩ,±5%,1/4W		
R70	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R71	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R72	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R73	CF,(ARD25T224J)	220kΩ,±5%,1/4W		
R74	CF,(ARD25T102J)	1kΩ,±5%,1/4W		Q'ty 0 or 1, *
R75	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R76	Var,MF,(RJ-6P 1kΩ)	1kΩ,1/2W		
R77	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R78	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R79	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R80	CF,(ARD25T182J)	1.8kΩ,±5%,1/4W		
R81	CF,(ARD25T330J)	33Ω,±5%,1/4W		
R82	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R83	Not assigned			
R84	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R85	Not assigned			
R86	CF,(ARD25T473J)	47kΩ,±5%,1/4W		
R87	CF,(ARD25T474J)	470kΩ,±5%,1/4W		
R88	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R89	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R90	Var,MF,(RJ-6P 100kΩ)	100kΩ,1/2W		
R91	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R92	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R93	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R94	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R95	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R96	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R97	CF,(ARD25T183J)	18kΩ,±5%,1/4W		
R98	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R99	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R100	CF,(ARD25T473J)	47kΩ,±5%,1/4W		
R101	Not assigned			
R102	Not assigned			
R103	Not assigned			
R104	Not assigned			
R105	Not assigned			

( ): Manufacturer's part number
* : Selected at factory

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Table 6-15 COMPONENT LIST OF BB DETECTOR (Z3)

CKT REF	DESCRIPTION	RATING		NOTE
R106	Not assigned			
R107	Not assigned			
R108	Not assigned			
R109	Not assigned			
R110	MF,(RN14K2E2321D)	232kΩ,±0.5%,1/4W		
R111	Not assigned			
R112	MF,(RN14K2E8660D)	866Ω,±0.5%,1/4W		
R113	CF,(ARD25T203J)	20kΩ,±5%,1/4W		
R114	Not assigned			
R115	CF,(ARD25T182J)	1.8kΩ,±5%,1/4W		
R116	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R117	MF,(RN14K2E4221D)	4.22kΩ,±0.5%,1/4W		
R118	MF,(RN14K2E4221D)	4.22kΩ,±0.5%,1/4W		
R119	MF,(RN14K2E2321D)	2.32kΩ,±0.5%,1/4W		
R120	CF,(ARD25T * J)	10Ω to 1.2kΩ,±5%, 1/4W		Q'ty 0 or 1, *
R121	MF,(RN14K2E1782D)	17.8kΩ,±0.5%,1/4W		
R122	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R123	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R124	CF,(ARD25T271J)	270Ω,±5%,1/4W		
R125	Not assigned			
R126	Not assigned			
R127	Not assigned			
R128	Not assigned			
R129	Not assigned			
R130	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R131	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R132	CF,(ARD25T*J)	220~1kΩ,±5%,1/4W		*
R133	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R134	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R135	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R136	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R137	CF,(ARD25T182J)	1.8kΩ,±5%,1/4W		
R138	CF,(ARD25T272J)	2.7kΩ,±5%,1/4W		
R139	Not assigned			
R140	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R141	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R142	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R143	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R144	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R145	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R146	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R147	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R148	Var,MF,(RJ-6P 1kΩ)	1kΩ,1/2W		
R149	CF,(ARD25T680J)	68Ω,±5%,1/4W		
R150	Not assigned			

( ): Manufacturer's part number
* : Selected at factory

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Table 6-15 COMPONENT LIST OF BB DETECTOR (Z3)

CKT REF	DESCRIPTION	RATING		NOTE
R151	Not assigned			
R152	Not assigned			
R153	Not assigned			
R154	Not assigned			
R155	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R156	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R157	Var,MF,(RJ-6P 10kΩ)	10kΩ,1/2W		
R158	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R159	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R160	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R161	Var,MF,(RJ-6P 500kΩ)	500kΩ,1/2W		
R162	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R163	CF,(ARD25T680J)	68Ω,±5%,1/4W		
R164	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R165	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R166	Var,MF,(RJ-6P 20kΩ)	20kΩ,1/2W		
R167	CF,(ARD25T682J)	6.8kΩ,±5%,1/4W		
R168	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R169	Var,MF,(RJ-6P 10kΩ)	10kΩ,1/2W		
R170	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R171	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R172	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R173	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R174	Var,MF,(RJ-6P 500Ω)	500Ω,1/2W		
R175	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R176	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R177	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R178	Var,MF,(RJ-6P 20kΩ)	20kΩ,1/2W		
R179	Not assigned			
R180	CF,(ARD25T473J)	47kΩ,±5%,1/4W		
R181	CF,(ARD25T333J)	33kΩ,±5%,1/4W		
R182	CF,(ARD25T473J)	47kΩ,±5%,1/4W		
R183	CF,(ARD25T473J)	47kΩ,±5%,1/4W		
R184	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R185	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R186	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R187	CF,(ARD25T272J)	2.7kΩ,±5%,1/4W		
R188	CF,(ARD25T683J)	68kΩ,±5%,1/4W		
R189	Not assigned			
R190	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R191	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R192	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R193	Not assigned			
R194	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R195	CF,(ARD25T821J)	820Ω,±5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

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Table 6-15 COMPONENT LIST OF BB DETECTOR (Z3)

CKT REF	DESCRIPTION	RATING		NOTE
R196	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R197	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R198	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R199	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R200	Not assigned			
R201	Not assigned			
R202	Not assigned			
R203	Not assigned			
R204	Not assigned			
R205	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R206	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R207	Not assigned			
R208	CF,(ARD25T822J)	8.2kΩ,±5%,1/4W		
R209	CF,(ARD25T330J)	33Ω,±5%,1/4W		
R210	CF,(ARD25T330J)	33Ω,±5%,1/4W		
R211	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R212	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R213	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R214	CF,(ARD25T272J)	2.7kΩ,±5%,1/4W		
R215	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R216	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R217	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R218	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R219	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R220	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R221	CF,(ARD25T680J)	68Ω,±5%,1/4W		
R222	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R223	CF,(ARD25T561J)	560Ω,±5%,1/4W		
R224	CF,(ARD25T561J)	560Ω,±5%,1/4W		
R225	Var,MF,(RJ-6P 50kΩ)	50kΩ,1/2W		
R226	CF,(ARD25T474J)	470kΩ,±5%,1/4W		
R227	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R228	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R229	Not assigned			
R230	Not assigned			
R231	Not assigned			
R232	Not assigned			
R233	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R234	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R235	CF,(ARD25T682J)	6.8kΩ,±5%,1/4W		
R236	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R237	Not assigned			
R238	Not assigned			
R239	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R240	Var,MF,(RJ-6P 100kΩ)	100kΩ,1/2W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-15 COMPONENT LIST OF BB DETECTOR (Z3)

CKT REF	DESCRIPTION	RATING		NOTE
R241	CF,(ARD25T474J)	470kΩ,±5%,1/4W		
R242	Not assigned			
R243	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R244	Not assigned			
R245	Not assigned			
R246	MF,(NRN1/4C4 50.0ΩD)	50Ω,±0.5%,1/4W		
R247	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R248	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R249	Not assigned			
R250	MF,(NRN1/4C4 267ΩD)	267Ω,±0.5%,1/4W		
R251	MF,(NRN1/4C4 330ΩD)	330Ω,±0.5%,1/4W		
R252	CF,(ARD25T680J)	68Ω,±5%,1/4W		
R253	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R254	Not assigned			
R255	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R256	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R257	MF,(NRN1/4C4 131ΩD)	131Ω,±0.5%,1/4W		
R258	MF,(NRN1/4C4 33ΩD)	33Ω,±0.5%,1/4W		
R259	MF,(NRN1/4C4 44.8ΩD)	44.8Ω,±0.5%,1/4W		
R260	Not assigned			
* R261	MF,(RN14K2E1002D)	10kΩ,±0.5%,1/4W		
R262	MF,(RN14K2E6040D)	604Ω,±0.5%,1/4W		
R263	MF,(RN14K2E1003D)	100kΩ,±0.5%,1/4W		
R264	Var,MF,(RJ-6P 20kΩ)	20kΩ,1/2W		
R265	Not assigned			
R266	CF,(ARD25T391J)	390Ω,±5%,1/4W		
R267	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R268	Not assigned			
R269	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R270	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R271	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R272	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R273	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R274	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R275	MF,(NRN1/4C4 105ΩD)	105Ω,±0.5%,1/4W		
R276	MF,(NRN1/4C4 665ΩD)	665Ω,±0.5%,1/4W		
R277	MF,(NRN1/4C4 83.9ΩD)	83.9Ω,±0.5%,1/4W		
R278	MF,(RN14K2E5111D)	5.11kΩ,±0.5%,1/4W		
R279	MF,(RN14K2E4991D)	4.99kΩ,±0.5%,1/4W		
R280	MF,(RN14K2E4641D)	4.64kΩ,±0.5%,1/4W		
R281	Var,MF,(RJ-6P 1kΩ)	1kΩ,1/2W		
R282	MF,(RN14K2E7501D)	7.5kΩ,±0.5%,1/4W		
R283	MF,(RN14K2E1003D)	100kΩ,±0.5%,1/4W		
R284	MF,(RN14K2E1003D)	100kΩ,±0.5%,1/4W		
R285	MF,(RN14K2E1001D)	1kΩ,±0.5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-15 COMPONENT LIST OF BB DETECTOR (Z3)

CKT REF	DESCRIPTION	RATING		NOTE
R286	MF,(RN14K2E2150D)	215Ω,±0.5%,1/4W		
R287	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R288	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R289	CF,(ARD25T122J)	1.2kΩ,±5%,1/4W		
R290	CF,(ARD25T680J)	68Ω,±5%,1/4W		
R291	MF,(NRN1/4C4 75.0ΩD)	75Ω,±0.5%,1/4W		
R292	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R293	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R294	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R295	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R296	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R297	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R298	Var,MF,(RJ-6P 500Ω)	500Ω,1/2W		
R299	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R300	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R301	MF,(NRN1/4C4 50.0ΩD)	50Ω,±0.5%,1/4W		
R302	MF,(NRN1/4C4 50.0ΩD)	50Ω,±0.5%,1/4W		
R303	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R304	CF,(ARD25T474J)	470kΩ,±5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-16 COMPONENT LIST OF DISCRIMINATOR (Z4)

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer,(CK924C1H473M)	0.047μF,±20%,50V		
C 2	Cer,(CK924C1H473M)	0.047μF,±20%,50V		
C 3	Cer,(CC924CH1H750J)	75pF,±5%,50V		
C 4	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C 5	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V		
C 6	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V		
C 7	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C 8	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C 9	Not assigned			
C10	Not assigned			
C11	Cer,(CC924CH1H220J)	22pF,±5%,50V		
C12	Cer,(CC924CH1H100D)	10pF,±0.5pF,50V		
C13	Cer,(CC924CH1H100D)	10pF,±0.5pF,50V		
C14	Cer,(CC924CH1H220J)	22pF,±5%,50V		
C15	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C16	Elect,(CE04W1V100)	10μF,±20%,35V		
C17	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		
C18	Elect,(CE04W1V100)	10μF,±20%,35V		
C19	Elect,(CE04W1J010)	1μF,±20%,63V		
C20	Not assigned			
C21	Cer,(CC924CH1H820J)	82pF,±5%,50V		
C22	Cer,(CC924CH1H471J)	470pF,±5%,50V		
C23	Cer,(RPE111CH271G50)	270pF,±2%,50V		
C24	Cer,(CC924CH1H151J)	150pF,±5%,50V		
C25	Cer,(RPE111CH361G50)	360pF,±2%,50V		
C26	Cer,(CC924CH1H560J)	56pF,±5%,50V		
C27	Cer,(RPE111CH241G50)	240pF,±2%,50V		
C28	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V		
	Plast,(ECQ-P1 133FZ)	0.013μF,±1%,100V		
C29	Not assigned			
C30	Elect,(CE04W1J010)	1μF,±20%,63V		
C31	Elect,(CE04W1V100)	10μF,±20%,35V		
C32	Plast,(ECQ-P1 273FZ)	0.027μF,±1%,100V		K type
	Plast,(ECQ-P1 153FZ)	0.015μF,±1%,100V		L type
	Plast,(ECQ-P1 183FZ)	0.018μF,±1%,100V		M type
C33	Plast,(ECQ-P1 272FZ)	2700pF,±1%,100V		K type
	Plast,(ECQ-P1 152FZ)	1500pF,±1%,100V		L type
	Plast,(ECQ-P1 182FZ)	1800pF,±1%,100V		M type
C34	Plast,(ECQ-P1 132FZ)	1300pF,±1%,100V		K type
	Cer,(RPE111CH821G50)	820pF,±2%,50V		L type
	Plast,(ECQ-M1H102KZ)	1000pF,±10%,50V		M type
C35	Cer,(CC924CH1H680J)	68pF,±5%,50V		K type
	Cer,(CC924CH1H470J)	47pF,±5%,50V		L type
	Cer,(CC924CH1H560J)	56pF,±5%,50V		M type
C36	Cer,(CC924CH1H910J)	91pF,±5%,50V		
C37	Cer,(CC924CH1H510J)	51pF,±5%,50V		
C38	Cer,(CC924CH1H101J)	100pF,±5%,50V		
C39	Cer,(CC924CH1H390J)	39pF,±5%,50V		
C40	Elect,(CE04W1J010)	1μF,±20%,63V		

( ): Manufacturer's part number
* : Selected at factory

Table 6-16 COMPONENT LIST OF DISCRIMINATOR (Z4)

CKT REF	DESCRIPTION	RATING		NOTE
C41	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		
C42	Elect,(CE04W1V100)	10μF,±20%,35V		
C43	Elect,(CE04W1J010)	1μF,±20%,63V		
C44	Cer,(RPE111CH131G50)	130pF,±2%,50V		
C45	Cer,(CC924CH1H360J)	36pF,±5%,50V		
C46	Cer,(CC924CH1H620J)	62pF,±5%,50V		
C47	Cer,(RPE111CH121G50)	120pF,±2%,50V		
C48	Cer,(CC924CH1H101J)	100pF,±5%,50V		
C49	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		
C50	Elect,(CE04W1J2R2)	2.2μF,±20%,63V		
C51	Elect,(CE04W1J2R2)	2.2μF,±20%,63V		
C52	Elect,(CE04W1J010)	1μF,±20%,63V		
C53	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C54	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C55	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C56	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C57	Elect,(CE04W1E470)	47μF,±20%,25V		
C58	Cer,(CK924C1H104M	0.1μF,±20%,25V		
C59	Elect,(CE04W1J010)	1μF,±20%,63V		
C60	Cer,(CK924C1H103M)	0.01μF,±20%,63V		
C61	Elect,(CE04W1E101)	100μF,±20%,25V		
C62	Elect,(CE04W1E221)	220μF,±20%,25V		
C63	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C64	Not assigned			
C65	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C66	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C67	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C68	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C69	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C70	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C71	Elect,(CE04W1V100)	10μF,±20%,35V		
C72	Elect,(CE04W1V100)	10μF,±20%,35V		
C73	Elect,(CE04W1J010)	1μF,±20%,63V		
C74	Not assigned			
C75	Not assigned			
C76	Not assigned			
C77	Not assigned			
C78	Not assigned			
C79	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		
C80	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V		
C81	Elect,(CE04W1V100)	10μF,±20%,35V		
C82	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		
C83	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		
C84	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		
C85	Cer,(CK924C1H102M)	1000pF,±20%,50V		

( ): Manufacturer's part number

* : Selected at factory

Table 6-16 COMPONENT LIST OF DISCRIMINATOR (Z4)

CKT REF	DESCRIPTION	RATING		NOTE
C86	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		
C87	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V		
C88	Elect,(CE04W1A470)	47μF,±20%,10V		
C89	Cer,(CC924CH1H221J)	220pF,±5%,50V		
C90	Cer,(CC45UJ1H220JY)	22pF,±5%,50V		
C91	Elect,(CE04W1E470)	47μF,±20%,25V		
C92	Plast,(ECQ-P1 152FZ)	1500pF,±1%,100V		
C93	Cer,(RPE111CH681G50)	680pF,±2%,50V		
C94	Plast,(ECQ-P1 152FZ)	1500pF,±1%,100V		
C95	Plast,(ECQ-P1 222FZ)	2200pF,±1%,100V		K type
	Plast,(ECQ-P1 102FZ)	1000pF,±1%,100V		L type
	Plast,(ECQ-P1 102FZ)	1000pF,±1%,100V		M type
C96	Cer,(RPE111CH391G50)	390pF,±2%,50V		K type
	Cer,(RPE111CH391G50)	390pF,±2%,50V		L type
	Cer,(RPE111CH821G50)	820pF,±2%,50V		M type
C97	Elect,(CE04W1V4R7)	4.7μF,±20%,35V		
C98	Elect,(CE04W1V4R7)	4.7μF,±20%,35V		
C99	Elect,(CE04W1E470)	47μF,±20%,25V		
C100	Elect,(CE04W1E470)	47μF,±20%,25V		
C101	Cer,(CC924CH1H101J)	100pF,±5%,50V		
C102	Cer,(CC924CH1H220J)	22pF,±5%,50V		
C103	Cer,(RPE111CH131G50)	130pF,±2%,50V		
C104	Elect,(CE04W1A470)	47μF,±20%,10V		
C105	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C106	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C107	Plast,(ECQ-M1H102KZ)	1000pF,±10%,50V		
C108	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C109	Cer,(CC924CH1H331J)	330pF,±5%,50V		
C110	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		
C111	Elect,(CE04W1J2R2)	2.2μF,±20%,63V		
C112	Plast,(ECQ-P1 *FZ)	8200pF to 0.033μF		*
C113	Not assigned			
C114	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C115	Elect,(CE04W1J2R2)	2.2μF,±20%,63V		
C116	Not assigned			
C117	Elect,(CE04W1J2R2)	2.2μF,±20%,63V		
C118	Elect,(CE04W1J2R2)	2.2μF,±20%,63V		
C119	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V		
C120	Elect,(CE04W1A470)	47μF,±20%,10V		
C121	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C122	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C123	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C124	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C125	Elect,(CE04W1J2R2)	2.2μF,±20%,63V		

( ): Manufacturer's part number

* : Selected at factory

Table 6-16 COMPONENT LIST OF DISCRIMINATOR (Z4)

CKT REF	DESCRIPTION	RATING		NOTE
C126	Cer,(RPE114C105M50)	1μF,±20%,50V		
C127	Elect,(CE04W1V220)	22μF,±20%,50V		
C128	Plast,(ECQ-M1H102KZ)	1000pF,±10%,50V		
C129	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C130	Elect,(CE04W1V100)	10μF,±20%,35V		
C131	Elect,(CE04W1J2R2)	2.2μF,±20%,63V		
C132	Elect,(CE04W1A101)	100μF,±20%,10V		
C133	Elect,(CE04W1A101)	100μF,±20%,10V		
C134	Elect,(CE04W1A470)	47μF,±20%,10V		
C135	Elect,(CE04W1A470)	47μF,±20%,10V		
C136	Elect,(CE04W1V100)	10μF,±20%,35V		
C137	Elect,(CE04W1V100)	10μF,±20%,35V		
C138	Elect,(CE04W1V100)	10μF,±20%,35V		
C139	Elect,(CE04W1V100)	10μF,±20%,35V		
C140	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C141	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C142	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C143	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C144	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C145	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C146	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C147	Cer,(RPE111CH111G50)	110pF,±2%,50V		
C148	Cer,(CC924CH1H910J)	91pF,±5%,50V		
C149	Cer,(CC924CH1H910J)	91pF,±5%,50V		
C150	Elect,(CE04W1A470)	47μF,±20%,10V		
C151	Elect,(CE04W1A470)	47μF,±20%,10V		
C152	Elect,(CE04W1A470)	47μF,±20%,10V		
C153	Elect,(CE04W1A470)	47μF,±20%,10V		
C154	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C155	Elect,(CE04W1V220)	22μF,±20%,35V		
C156	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C157	Plast,(ECQ-M1H222KZ)	2200pF,±10%,50V		Q'ty 0 or 1, *
C158	Plast,(ECQ-M1H102KZ)	1000pF,±10%,50V		
C159	Plast,(ECQ-M1H102KZ)	1000pF,±10%,50V		
C160	Elect,(CE04W1J2R2)	2.2μF,±20%,63V		
K 1	Relay,(PRAD-4(5V))			
K 2	Relay,(PRAD-4(5V))			
L 1	Coil,(LF8-470K	47μH		
L 2	Coil,(LF8-470K)	47μH		
L 3	Coil,(LV1-010)	1μH		
L 4	Coil,(LV1-330)	33μH		
L 5	Coil,(LV1-1R5)	1.5μH		

( ): Manufacturer's part number

* : Selected at factory

Table 6-16 COMPONENT LIST OF DISCRIMINATOR (Z4)

CKT REF	DESCRIPTION	RATING		NOTE
L 6	Coil,(LF8-221K)	220μH		
L 7	Coil,(339T20195A)	0.58μH		
L 8	Coil,(LV1-1R5)	1.25μH		
L 9	Coil,(LV1-1R5)	1.62μH		
L10	Not assigned			
L11	Not assigned			
L12	Coil,(LF8-221K)	220μH		
L13	Coil,(LV1-221)	220μH		
L14	Coil,(LV1-221)	220μH		
L15	Coil,(LV1-101)	100μH		
L16	Coil,(LV1-680)	68μH		
L17	Coil,(LV1-220)	22μH		
L18	Coil,(LV1-220)	22μH		
L19	Coil,(LV1-6R8)	6.8μH		
L20	Coil,(LV1-6R8)	6.8μH		
L21	Coil,(LF8-221K)	220μH		
L22	Coil,(LF8-221K)	220μH		
L23	Coil,(LF8-221K)	220μH		
L24	Coil,(LV2-152)			
L25	Coil,(339T20184C)	2.2mH		
L26	Coil,(LV2-102)	1mH		
L27	Coil,(10K17-75T)	0.19μH		
L28	Coil,(339T20195A)	0.373μH		
L29	Coil,(LF8-101K)	100μH		
L30	Coil,(LF8-101K)	100μH		
L31	Coil,(LF8-101K)	100μH		
L32	Coil,(LF8-101K)	100μH		
L33	Coil,(LF8-101K)	100μH		
L34	Coil,(LF8-101K)	100μH		
L35	Not assigned			
L36	Not assigned			
L37	Coil,(10K17-65T)			
L38	Coil,(LV2-681)			
Q 1	Tr,(2SC1252)			
Q 2	Tr,(2SC1252)			
Q 3	Tr,(2SC1252)			
Q 4	Tr,(2SC2901)			
Q 5	Tr,(2SC1252)			
Q 6	IC,(UA733CN)			
Q 7	Tr,(2SC2901)			
Q 8	Tr,(2SC2901)			
Q 9	Tr,(2SC1252)			
Q10	Di,(1S953)			

( ): Manufacturer's part number

* : Selected at factory

Table 6-16 COMPONENT LIST OF DISCRIMINATOR (Z4)

CKT REF	DESCRIPTION	RATING		NOTE
Q11	Di,(1S953)			
Q12	Di,(1S953)			
Q13	Di,(1S953)			
Q14	Di,(1S953)			
Q15	Di,(1S953)			
Q16	Di,(1S953)			
Q17	Di,(1S953)			
Q18	Di,(1S953)			
Q19	IC,(μPA67C)			
Q20	IC,(μPA67C)			
Q21	IC,(74LS27)			
Q22	IC,(74LS00)			
Q23	Tr,(2SC2901)			
Q24	Di,(1SS97)			
Q25	Di,(1SS97)			
Q26	Di,(1S2222)			
Q27	IC,(74LS10)			
Q28	IC,(μPB702B)			
Q29	Di,(1S953)			
Q30	Tr,(2SA708)			
Q31	Di,breakdown,(RD6.2EB)	5.8 to 6.6V,400mW		
Q32	Di,(2-1K34AK)			
Q33	Di,(1S953)			
Q34	IC,(74LS08)			
Q35	IC,(74LS08)			
Q36	Di,(1S953)			
Q37	Di,(1S953)			
Q38	Di,breakdown, (RD5.1E(3))	4.95 to 5.2V,400mW		
Q39	Tr,(2SC2901)			
Q40	Tr,(2SC2901)			
Q41	Tr,(2SC2901)			
Q42	IC,(74LS290)			
Q43	IC,(HD74121)			
Q44	Tr,(2SA1151)			
Q45	Tr,(2SA1151)			
Q46	Tr,(2SA1151)			
Q47	IC,(μPC151C)			
Q48	Di,breakdown,(1SZ52)	5.9 to 6.5V,250mW		
Q49	Di,breakdown,(RD6.2EB)	5.8 to 6.6V,400mW		
Q50	IC,(μPC177C)			
Q51	IC,(74LS27)			
Q52	Di,breakdown,(RD7.5EB)	7.0 to 7.9V,400mW		
Q53	Di,(1S953)			
Q54	IC,(TC4053BP)			
Q55	IC,(μPC55A)			

( ): Manufacturer's part number
* : Selected at factory

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Table 6-16 COMPONENT LIST OF DISCRIMINATOR (Z4)

CKT REF	DESCRIPTION	RATING		NOTE
Q56	Di,breakdown,(1SZ52)	5.9 to 6.5V,250mW		
Q57	Di,breakdown,(RD3.9EB)	3.7 to 4.1V,400mW		
Q58	Di,breakdown,(RD3.9EB)	3.7 to 4.1V,400mW		
Q59	Tr,(2SC2718)			
Q60	IC,(ICL8038CCJD)			
Q61	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q62	IC,(μPC251C)			
Q63	Tr,(2SC2718)			
Q64	Tr,(2SC2718)			
Q65	IC,(TC4053BP)			
Q66	IC,(μPC251C)			
Q67	IC,(μPC803C)			
Q68	IC,(74121)			
Q69	Tr,(2SC2718)			
Q70	Di,(1S953)			
Q71	Di,(1S953)			
Q72	Di,(1S953)			
Q73	IC,(μPC251C)			
Q74	Di,(1S953)			
Q75	Di,(1S953)			
Q76	IC,(μPC251C)			
Q77	Di,(1S2222)			
Q78	Di,(1S2222)			
Q79	Di,(1S2222)			
Q80	IC,(TC4053BP)			
Q81	Di,breakdown,(RD3.9EB)	3.7 to 4.1V,400mW		
Q82	IC,(μPC251C)			
Q83	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q84	Di,(1S953)			
Q85	IC,(7403)			
Q86	IC,(74121)			
Q87	Tr,(2SC2718)			
R 1	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R 2	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R 3	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R 4	CF,(ARD25T121J)	120Ω,±5%,1/4W		
R 5	CF,(ARD25T100J)	10Ω,±5%,1/4W		
R 6	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R 7	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R 8	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R 9	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R10	CF,(ARD25T102J)	1kΩ,±5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

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Table 6-16 COMPONENT LIST OF DISCRIMINATOR (Z4)

CKT REF	DESCRIPTION	RATING		NOTE
R11	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R12	CF,(ARD25T560J)	56Ω,±5%,1/4W		
R13	CF,(ARD25T560J)	56Ω,±5%,1/4W		
R14	CF,(ARD25T511J)	510Ω,±5%,1/4W		
R15	CF,(ARD25T391J)	390Ω,±5%,1/4W		
R16	CF,(ARD25T391J)	390Ω,±5%,1/4W		
R17	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R18	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R19	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R20	CF,(ARD25T220J)	22Ω,±5%,1/4W		
R21	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R22	MF,(RN14K2H471J)	470Ω,±5%,1/2W		
R23	CF,(ARD25T680J)	68Ω,±5%,1/4W		
R24	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R25	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R26	CF,(ARD25T682J)	6.8kΩ,±5%,1/4W		
R27	CF,(ARD25T682J)	6.8kΩ,±5%,1/4W		
R28	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R29	Not assigned			
R30	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R31	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R32	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R33	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R34	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R35	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R36	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R37	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R38	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R39	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R40	Not assigned			
R41	Var,MF,(RJ-6S 100Ω)	100Ω,1/2W		
R42	Var,MF,(RJ-6S 100Ω)	100Ω,1/2W		
R43	Var,MF,(RJ-6S 100Ω)	100Ω,1/2W		
R44	Var,MF,(RJ-6S 100Ω)	100Ω,1/2W		
R45	Var,MF,(RJ-6S 100Ω)	100Ω,1/2W		
R46	Var,MF,(RJ-6S 100Ω)	100Ω,1/2W		
R47	Var,MF,(RJ-6S 100Ω)	100Ω,1/2W		
R48	Var,MF,(RJ-6S 100Ω)	100Ω,1/2W		
R49	Var,MF,(RJ-6S 100Ω)	100Ω,1/2W		
R50	Not assigned			
R51	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R52	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R53	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R54	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R55	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R56	CF,(ARD25T272J)	2.7kΩ,±5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

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Table 6-16 COMPONENT LIST OF DISCRIMINATOR (Z4)

CKT REF	DESCRIPTION	RATING		NOTE
R57	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R58	Not assigned			
R59	Not assigned			
R60	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R61	Not assigned			
R62	Not assigned			
R63	CF,(ARD25T392J)	3.9kΩ,±5%,1/4W		
R64	Not assigned			
R65	Not assigned			
R66	Not assigned			
R67	CF,(ARD25T271J)	270Ω,±5%,1/4W		
R68	CF,(ARD25T271J)	270Ω,±5%,1/4W		
R69	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R70	Not assigned			
R71	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R72	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R73	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R74	CF,(ARD25T271J)	270Ω,±5%,1/4W		
R75	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R76	CF,(ARD25T * J)	330Ω to ∞ ,±5%,1/4W		Q'ty 0 or 1 *
R77	CF,(ARD25T330J)	33Ω,±5%,1/4W		
R78	MF,(RN14K2E2940D)	294Ω,±0.5%,1/4W		
R79	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R80	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R81	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R82	CF,(ARD25T561J)	560Ω,±5%,1/4W		
R83	CF,(ARD25T561J)	560Ω,±5%,1/4W		
R84	CF,(ARD25T561J)	560Ω,±5%,1/4W		
R85	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R86	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R87	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R88	Not assigned			
R89	Not assigned			
R90	MF,(RS1PB 68ΩJ)	68Ω,±5%,1W		
R91	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R92	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R93	Var,MF,(RJ-6S 100Ω)	100Ω,1/2W		
R94	Not assigned			
R95	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R96	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R97	CF,(ARD25T680J)	68Ω,±5%,1/4W		
R98	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R99	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R100	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R101	CF,(ARD25T221J)	220Ω,±5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

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Table 6-16 COMPONENT LIST OF DISCRIMINATOR (Z4)

CKT REF	DESCRIPTION	RATING		NOTE
R102	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R103	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R104	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R105	MF,(RN14K2E1001D)	1kΩ,±0.5%,1/4W		
R106	MF,(RN14K2E2871D)	2.87kΩ,±0.5%,1/4W		
R107	MF,(RN14K2E3401D)	3.4kΩ,±0.5%,1/4W		
R108	MF,(RN14K2E1001D)	1kΩ,±0.5%,1/4W		
R109	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R110	MF,(RN14K2E2491D)	2.49kΩ,±0.5%,1/2W		
R111	MF,(RN14K2E5111D)	5.11kΩ,±0.5%,1/2W		
R112	Var,MF,(RJ-6S 1kΩ)	1kΩ,1/2W		
R113	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R114	MF,(RN14K2E3401D)	3.4kΩ,±0.5%,1/4W		
R115	MF,(RN14K2E3401D)	3.4kΩ,±0.5%,1/4W		
R116	MF,(RN14K2E1501D)	1.5kΩ,±0.5%,1/4W		
R117	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R118	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R119	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R120	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R121	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R122	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R123	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R124	CF,(ARD25T474J)	470kΩ,±5%,1/4W		
R125	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R126	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R127	CF,(ARD25T562J)	5.6kΩ,±5%,1/4W		
R128	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R129	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R130	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R131	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R132	CF,(ARD25T822J)	8.2kΩ,±5%,1/4W		
R133	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R134	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R135	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R136	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R137	CF,(ARD25T561J)	560Ω,±5%,1/4W		
R138	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R139	CF,(ARD25T * J)	100kΩ to 1MΩ,±5%, 1/4W		Q'ty 0 or 1 *
R140	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R141	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R142	Var,MF,(RJ-6S 500kΩ)	500kΩ,1/2W		
R143	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R144	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R145	Var,MF,(RJ-6S 2kΩ)	2kΩ,1/2W		
R146	CF,(ARD25T223J)	22kΩ,±5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-16 COMPONENT LIST OF DISCRIMINATOR (Z4)

CKT REF	DESCRIPTION	RATING		NOTE
R147	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R148	CF,(ARD25T682J)	6.8kΩ,±5%,1/4W		
R149	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R150	Not assigned			
R151	Var,MF,(RJ-6S 20kΩ)	20kΩ,1/2W		
R152	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R153	CF,(ARD25T334J)	330kΩ,±5%,1/4W		
R154	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R155	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R156	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R157	CF,(ARD25T391J)	390Ω,±5%,1/4W		
R158	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R159	Var,MF,(RJ-6P 100kΩ)	100kΩ,1/2W		
R160	Var,MF,(RJ-6P 100kΩ)	100kΩ,1/2W		
R161	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R162	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R163	Var,MF,(RJ-6P 100kΩ)	100kΩ,1/2W		
R164	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R165	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R166	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R167	CF,(ARD25T333J)	33kΩ,±5%,1/4W		
R168	CF,(ARD25T333J)	33kΩ,±5%,1/4W		
R169	Var,MF,(RJ-6P 5kΩ)	5kΩ,1/2W		
R170	CF,(ARD25T333J)	33kΩ,±5%,1/4W		
R171	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R172	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R173	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R174	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R175	CF,(ARD25T273J)	27kΩ,±5%,1/4W		
R176	Var,MF,(RJ-6P 10kΩ)	10kΩ,1/2W		
R177	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R178	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R179	Var,MF,(RJ-6P 20kΩ)	20kΩ,1/2W		
R180	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R181	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R182	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R183	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R184	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R185	CF,(ARD25T153J)	15kΩ,±5%,1/4W		
R186	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R187	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R188	Not assigned			
R189	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R190	CF,(ARD25T154J)	150kΩ,±5%,1/4W		
R191	Not assigned			

( ): Manufacturer's part number
* : Selected at factory

Table 6-16 COMPONENT LIST OF DISCRIMINATOR (Z4)

CKT REF	DESCRIPTION	RATING		NOTE
R192	CF,(ARD25T683J)	68kΩ,±5%,1/4W		
R193	CF,(ARD25T684J)	680kΩ,±5%,1/4W		
R194	CF,(ARD25T224J)	220kΩ,±5%,1/4W		
R195	Var,MF,(RJ-6S 50kΩ)	50kΩ,1/2W		
R196	Var,MF,(RJ-6S 100kΩ)	100kΩ,1/2W		
R197	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R198	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R199	CF,(ARD25T473J)	47kΩ,±5%,1/4W		
R200	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R201	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R202	CF,(ARD25T683J)	68kΩ,±5%,1/4W		
R203	CF,(ARD25T683J)	68kΩ,±5%,1/4W		
R204	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R205	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R206	Not assigned			
R207	CF,(ARD25T333J)	33kΩ,±5%,1/4W		
R208	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R209	CF,(ARD25T220J)	22Ω,±5%,1/4W		
R210	Not assigned			
R211	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R212	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R213	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R214	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R215	CF,(ARD25T224J)	220kΩ,±5%,1/4W		
R216	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R217	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R218	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R219	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R220	CF,(ARD25T474J)	470kΩ,±5%,1/4W		
R221	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R222	CF,(ARD25T473J)	47kΩ,±5%,1/4W		
R223	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R224	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R225	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R226	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R227	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R228	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R229	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R230	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R231	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R232	Not assigned			
R233	CF,(ARD25T100J)	10Ω,±5%,1/4W		
R234	CF,(ARD25T150J)	15Ω,±5%,1/4W		
R235	CF,(ARD25T333J)	33kΩ,±5%,1/4W		
R236	CF,(ARD25T474J)	470kΩ,±5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-16 COMPONENT LIST OF DISCRIMINATOR (Z4)

CKT REF	DESCRIPTION	RATING		NOTE
R237	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R238	Var,MF,(RJ-6S 100Ω)	100Ω,1/2W		
R239	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R240	Var,MF,(RJ-6S 100Ω)	100Ω,1/2W		
R241	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R242	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R243	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R244	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R245	CF,(ARD25T333J)	33kΩ,±5%,1/4W		
R246	CF,(ARD25T473J)	47kΩ,±5%,1/4W		
R247	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R248	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R249	Var,MF,(RJ-6P 500kΩ)	500kΩ,1/2W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-17 COMPONENT LIST OF IF MIX AND RETURN LOSS (Z5)

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer,(RPD670C4 472M50V)	4700pF,±20%,50V		
C 2	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C 3	Not assigned			
C 4	Not assigned			
C 5	Not assigned			
C 6	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C 7	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C 8	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C 9	Cer,(CK924C1H222M)	2200pF,±20%,50V		
C10	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C11	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C12	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C13	Cer,(RPN710C223M50V)	0.022μF,±20%,50V		
C14	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C15	Cer,(RPN710C223M50V)	0.022μF,±20%,50V		
C16	Cer,(RPN710C223M50V)	0.022μF,±20%,50V		
C17	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C18	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C19	Elect,(CE04W1V4R7)	4.7μF,±20%,35V		
C20	Cer,(RD340CK010CY50)	1pF,±0.25pF,50V		Q'ty 0 or 1, *
C21	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C22	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C23	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C24	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C25	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C26	Cer,(CK924C1H102M	1000pF,±20%,50V		
C27	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C28	Not assigned			
C29	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C30	Cer,(CC924CK1H020C)	2pF,±0.25pF,50V		
C31	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C32	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C33	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C34	Not assigned			
C35	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C36	Elect,(CE04W1V220)	22μF,±20%,35V		
C37	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C38	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C39	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C40	Plast,(ECQ-P1 * FZ)	8200pF to 0.033μF, ±1%,100V		*
C41	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C42	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C43	Elect,(CE04W1V220)	22μF,±20%,35V		
C44	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C45	Cer,(CK924C1H472M)	4700pF,±20%,50V		

( ): Manufacturer's part number
* : Selected at factory

Table 6-17 COMPONENT LIST OF IF MIX AND RETURN LOSS (Z5)

CKT REF	DESCRIPTION	RATING		NOTE
C46	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C47	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C48	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C49	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C50	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C51	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C52	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C53	Cer,(CC924CH1H220J)	22pF,±5%,50V		
C54	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C55	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C56	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C57	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C58	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C59	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C60	Not assigned			
C61	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C62	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C63	Not assigned			
C64	Not assigned			
C65	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C66	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C67	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C68	Cer,(CC924CH1H430J)	43pF,±5%,50V		
C69	Cer,(CC924CH1H100D)	10pF,±0.5pF,50V		
C70	Not assigned			
C71	Not assigned			
C72	Cer,(CC924CH1H680J)	68pF,±5%,50V		
C73	Cer,(CC924CH1H100D)	10pF,±0.5pF,50V		
C74	Cer,(CC924CH1H330J)	33pF,±5%,50V		
C75	Cer,(CC924CK1H020C)	2pF,±0.25pF,50V		
C76	Cer,(CC924CH1H680J)	68pF,±5%,50V		
C77	Cer,(CC924CK1H020C)	2pF,±0.25pF,50V		
C78	Cer,(CC924CH1H330J)	33pF,±5%,50V		
C79	Not assigned			
C80	Not assigned			
C81	Cer,(CC924CH1H270J)	27pF,±5%,50V		
C82	Not assigned			
C83	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C84	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C85	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C86	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C87	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C88	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C89	Plast,(ECQ-P1 152FZ)	1500pF,±1%,100V		
C90	Not assigned			

( ): Manufacturer's part number
* : Selected at factory

Table 6-17 COMPONENT LIST OF IF MIX AND RETURN LOSS (Z5)

CKT REF	DESCRIPTION	RATING		NOTE
C91	Cer,(CC924CH1H100D)	10pF,±0.5pF,50V		
C92	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C93	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C94	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C95	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C96	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C97 to C108	Not assigned			
C109	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C110	Cer,(RPE111CH331G50)	330pF,±2%,50V		
C111	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C112	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C113	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C114	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C115	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C116	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C117	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C118	Cer,(CK924C1H473M)	0.047μF,±20%,50V		
C119	Elect,(CE04W1J2R2)	2.2μF,±20%,63V		
C120	Not assigned			
C121	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C122	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C123	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C124	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C125	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C126	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C127	Cer,(RPE111CH181G50)	180pF,±2%,50V		
C128	Cer,(RPE111CH151G50)	150pF,±2%,50V		
C129	Cer,(CC924CH1H101J)	100pF,±5%,50V		
C130	Not assigned			
C131	Cer,(CC924CH1H100D)	10pF,±0.5pF,50V		
C132	Cer,(CC924CH1H331J)	330pF,±5%,50V		
C133	Elect,(CE04W1V100)	10μF,±20%,35V		
C134	Elect,(CE04W1V100)	10μF,±20%,35V		
C135	Cer,(CC924CH1H101J)	100pF,±5%,50V		
C136	Elect,(CE04W1V100)	10μF,±20%,35V		
C137	Elect,(CE04W1V100)	10μF,±20%,35V		
C138	Plast,(ECQ-P1 562FZ)	5600pF,±1%,100V		
C139	Cer,(CC924CH1H680J)	68pF,±5%,50V		
C140	Plast,(ECQ-P1 * FZ)	2400pF to 0.001μF, 100V		*
C141	Plast,(ECQ-P1 162FZ)	1600pF,±1%,100V		
C142	Not assigned			
C143	Plast,(ECQ-P1 162FZ)	1600pF,±1%,100V		
C144	Elect,(CE04W1A470)	47μF,±20%,10V		
C145	Elect,(CE04W1A470)	47μF,±20%,10V		

( ): Manufacturer's part number
* : Selected at factory

Table 6-17 COMPONENT LIST OF IF MIX AND RETURN LOSS (Z5)

CKT REF	DESCRIPTION	RATING		NOTE
C146	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C147	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C148	Not assigned			
C149	Not assigned			
C150	Cer,(RPE111CH181G50)	180pF,±2%,50V		
C152	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C152	Cer,(RD340CK010CY50)	1pF,±0.25pF,50V		
C153	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C154	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		
C155	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C156	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C157	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C158	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C159	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C160	Not assigned			
C161	Cer,(RPE111CH361G50)	360pF,±2%,50V		
C162	Cer,(CC924CH1H330J)	33pF,±5%,50V		
C163	Cer,(RPE111CH361G50)	360pF,±2%,50V		
C164	Not assigned			
C165	Cer,(CK924CH1H472M)	4700pF,±20%,50V		
C166	Cer,(CK924C1H222M)	2200pF,±20%,50V		
C167	Cer,(CK924C1H222M)	2200pF,±20%,50V		
C168	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C169	Cer,(CK924C1H473M)	0.047μF,±20%,50V		
C170	Not assigned			
C171	Cer,(CK924C1H473M)	0.047μF,±20%,50V		
C172	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C173	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C174	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C175	Not assigned			
C176	Not assigned			
C177	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C178	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C179	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C180	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C181	Cer,(CK924C1H222M)	2200pF,±20%,50V		
C182	Cer,(CK924C1H222M)	2200pF,±20%,50V		
C183	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C184	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C185	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C186	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C187	Not assigned			
C188	Not assigned			
C189	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C190	Not assigned			

( ): Manufacturer's part number
* : Selected at factory

Table 6-17 COMPONENT LIST OF IF MIX AND RETURN LOSS (Z5)

CKT REF	DESCRIPTION	RATING		NOTE
C191	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C192	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C193	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C194	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C195	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C196	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C197	Cer,(CC924CH1H101J)	100pF,±5%,50V		
C198	Elect,(CE04W1V100)	10μF,±20%,35V		
C199	Elect,(CE04W1V100)	10μF,±20%,35V		
C200	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C201	Cer,(CK924C1H223M)	0.022μF,±20%,50V		
C202	Cer,(CC924CH1H680J)	68pF,±5%,50V		
C203	Elect,(CE04W1V100)	10μF,±20%,35V		
C204	Elect,(CE04W1V100)	10μF,±20%,35V		
C205	Cer,(RPE111CH681G50)	680pF,±2%,50V		K type
	Cer,(RPE111CH331G50)	330pF,±2%,50V		L type
	Cer,(RPE111CH391G50)	390pF,±2%,50V		M type
C206	Plast,(ECQ-P1 562FZ)	5600pF,±1%,100V		K type
	Plast,(ECQ-P1 302FZ)	3000pF,±1%,100V		L type
	Plast,(ECQ-P1 362FZ)	3600pF,±1%,100V		M type
C207	Tant,(CS02H1C3R3M)	3.3μF,±20%,16V		
C208	Cer,(CK924C1H222M)	2200pF,±20%,50V		
C209	Elect,(CE04W1V220)	22μF,±20%,35V		
C210	Cer,(CK924C1H473M)	0.047μF,±20%,50V		
C211	Elect,(CE04W1V220)	22μF,±20%,35V		
C212	Elect,(CE04W1V220)	22μF,±20%,35V		
C213	Elect,(CE04W1V220)	22μF,±20%,35V		
C214	Elect,(CE04W1V220)	22μF,±20%,35V		
C215	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C216	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C217	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C218	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C219	Plast,(ECQ-P1 * FZ)	8200pF to 0.033μF, ±1%,100V		*
C220	Not assigned			
C221	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C222	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C223	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C224	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C225	Cer,(CC924CH1H220J)	22pF,±5%,50V		
C226	Cer,(RPE111CH221G50)	220pF,±2%,50V		K type
	Cer,(RPE111CH121G50)	120pF,±2%,50V		L type
	Cer,(RPE111CH151G50)	150pF,±2%,50V		M type
C227	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C228	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C229	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C230	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C231	Plast,(ECQ-P1 153FZ)	0.015μF,±1%,100V		
C232	Plast,(ECQ-P1 362FZ)	3600pF,±1%,100V		

( ): Manufacturer's part number

* : Selected at factory.

Table 6-17 COMPONENT LIST OF IF MIX AND RETURN LOSS (Z5)

CKT REF	DESCRIPTION	RATING	NOTE
C233	Plast,(ECQ-P1 153FZ)	0.015μF,±1%,100V	
J 1	Pattern		
J 2	Receptacle, (BNC-R601-NI)		
J 3	Receptacle, (BNC-R601-NI)		
J 4	Connector,(27DP-LR-PC)		
J 5	Plug,(27DP-P-1.5)		
K 1	Relay,(SF-102)		
K 2	Relay,(SF-102)		
K 3	Relay,(SA-102)		
L 1	Coil,(34L23587B)		
L 2	Coil,(34L23587B)		
L 3	Coil,(34L23587B)		
L 4	Coil,(SP0408-R15K)	0.15μH	
L 5	Coil,(44T46070A)		
L 6	Coil,(LF8-221K)	220μH	
L 7	Coil,(LF8-221K)	220μH	
L 8	Coil,(LF8-221K)	220μH	
L 9	Coil,(339T10267A)	0.416μH	
L10	Coil,(LV2-102)	1mH	
L11	Coil,(10K17-85T)	0.326μH	
L12	Coil,(339T10267A)	0.299μH	
L13	Coil,(LF8-221K)	220μH	
L14	Coil,(34L23587B)		
L15	Not assigned		
L16	Coil,(10K-17-25T)	0.055μH	
L17	Coil,(339T10627A)	7.3μH	
L18	Coil,(LF8-221K)	220μH	
L19	Coil,(LF8-221K)	220μH	
L20	Not assigned		
L21	Coil,(10K-17-25T)		
L22	Coil,(LF8-221K)	220μH	
L23	Coil,(LF8-221K)	220μH	
L24	Coil,(LF8-221K)	220μH	
L25	Coil,(LV1-1R5)	1.5μH	
L26	Coil,(FS1012S-332K)	3.3mH	
L27	Coil,(LV1-1R5)	1.5μH	
L28	Coil,(LV2-332)	3.3mH	
L29	Not assigned		
L30	Coil,(442T46012D)		

( ): Manufacturer's part number

* : Selected at factory

Table 6-17 COMPONENT LIST OF IF MIX AND RETURN LOSS (Z5)

CKT REF	DESCRIPTION	RATING		NOTE
L31	Coil,(LF8-221K)	220μH		
L32	Coil,(339T10267A)	0.214μH		
L33	Coil,(LV1 2R2)	2.28uH		
L34	Coil,(339T10267A)	0.214μH		
L35	Coil,(LF8-221K)	220μH		
L36	Coil,(LF8-221K)	220μH		
L37	Coil,(LF8-221K)	220μH		
L38	Not assigned			
L39	Coil,(LV3-103)			
L40	Not assigned			
L41	Coil,(LF8-221K)	220μH		
L42	Coil,(LV2-102)			
L43	Coil,(LV2-102)			
L44	Coil,(LF8-100K)	10μH		
L45	Coil,(LF8-100K)	10μH		
L46	Coil,(LF8-100K)	10μH		
L47	Coil,(LF8-100K)	10μH		
L48	Coil,(LV2-681)	680μH		
L49	Coil,(LV2-102)	1mH		
Q 1	Di,(1S2222)			
Q 2	Di,(1S2222)			
Q 3	Di,(1S2222)			
Q 4	Di,(1S2222)			
Q 5	Tr,(2SC2368)			
Q 6	Tr,(2SC2368)			
Q 7	Di,(1SS99)			
Q 8	Di,(1S953)			
Q 9	Di,(1S953)			
Q10	Tr,(2SC2148)			
Q11	Di,(1S953)			
Q12	Tr,(2SC1254)			
Q13	Di,(FC53M)			
Q14	Tr,(2SC1254)			
Q15	Tr,(2SC1254)			
Q16	Tr,(2SC1254)			
Q17	Tr,(2SC1254)			
Q18	Tr,(2SC1252)			
Q19	Tr,(2SC1252)			
Q20	Tr,(2SC2718)			
Q21	Tr,(2SC2368)			
Q22	Tr,(2SC1252)			
Q23	Tr,(2SC1252)			
Q24	Not assigned			
Q25	Not assigned			

( ): Manufacturer's part number

* : Selected at factory

Table 6-17 COMPONENT LIST OF IF MIX AND RETURN LOSS (Z5)

CKT REF	DESCRIPTION	RATING		NOTE
Q26	Tr,(2SC2368)			
Q27	IC,(UA733CN)			
Q28	Tr,(2SC2901)			
Q29	Tr,(2SC2901)			
Q30	Not assigned			
Q31	Tr,(2SC2901)			
Q32	Tr,(2SC2901)			
Q33	Not assigned			
Q34	Not assigned			
Q35	Not assigned			
Q36	Not assigned			
Q37	Not assigned			
Q38	Not assigned			
Q39	Not assigned			
Q40	Not assigned			
Q41	Not assigned			
Q42	Di,(1S2222)			
Q43	Di,(1S2222)			
Q44	Tr,(2SC2901)			
Q45	Di,(1SS97)			
Q46	Di,(1SS97)			
Q47	Di,(1SS97)			
Q48	Di,(1SS97)			
Q49	IC,(UA733CN)			
Q50	Di,(1S953)			
Q51	Tr,(2SC2901)			
Q52	Di,(1S953)			
Q53	Di,(1S953)			
Q54	IC,(μPC251C)			
Q55	Tr,(2SA1151)			
Q56	Di,(1SS97)			
Q57	Di,(1SS97)			
Q58	IC,(μPC251C)			
Q59	IC,(μPC251C)			
Q60	Tr,(2SC2718)			
Q61	Tr,(2SC2718)			
Q62	Di,breakdown,(RD7.5EB)	7.0 to 7.9V,400mW		
Q63	Di,breakdown,(RD7.5EB)	7.0 to 7.9V,400mW		
Q64	IC,(μPC251C)			
Q65	Di,(1S953)			
Q66	Di,(1S953)			
Q67	Tr,(2SC2148)			
Q68	Tr,(2SC2148)			
Q69	Tr,(2SC2148)			
Q70	Not assigned			

( ): Manufacturer's part number

* : Selected at factory

Table 6-17 COMPONENT LIST OF IF MIX AND RETURN LOSS (Z5)

CKT REF	DESCRIPTION	RATING		NOTE
Q71	IC,(UA733CN)			
Q72	Di,(1S2222)			
Q73	Tr,(2SC2901)			
Q74	Tr,(2SC2901)			
Q75	Tr,(2SC2901)			
Q76	IC,(UA733CN)			
Q77	Di,(1S2222)			
Q78	Tr,(2SA711)			
Q79	Tr,(2SC2901)			
Q80	Not assigned			
Q81	Tr,(2SC2901)			
Q82	Tr,(2SC2901)			
Q83	Not assigned			
Q84	Not assigned			
Q85	Tr,(2SC2901)			
Q86	Di,(1SS97)			
Q87	Di,(1SS97)			
Q88	IC,(μPC254A)			
Q89	IC,(μPC251C)			
Q90	Tr,(2SC2718)			
Q91	IC,(μPA39A)			
Q92	IC,(TC4053BP)			
Q93	IC,(μPC251C)			
Q94	Di,(1S953)			
Q95	Di,(1S953)			
Q96	Di,(1S953)			
Q97	IC,(μPC451C)			
Q98	Di,(1S953)			
Q99	Di,(1S953)			
Q100	Not assigned			
Q101	Di,(1S953)			
Q102	Di,(1S953)			
R 1	MF,(NRN1/4C4 439ΩD)	439Ω,±0.5%,1/4W		
R 2	MF,(NRN1/4C4 439ΩD)	439Ω,±0.5%,1/4W		
R 3	MF,(NRN1/4C4 26.7ΩD)	26.7Ω,±0.5%,1/4W		
R 4	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R 5	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R 6	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R 7	MF,(NRN1/4C4 332ΩD)	332Ω,±0.5%,1/4W		
R 8	MF,(NRN1/4C4 332ΩD)	332Ω,±0.5%,1/4W		
R 9	MF,(NRN1/4C4 35.7ΩD)	35.7Ω,±0.5%,1/4W		
R10	Not assigned			

( ): Manufacturer's part number
* : Selected at factory

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Table 6-17 COMPONENT LIST OF IF MIX AND RETURN LOSS (Z5)

CKT REF	DESCRIPTION	RATING		NOTE
R11	MF,(NRN1/4C4 174ΩD)	174Ω,±0.5%,1/4W		
R12	MF,(NRN1/4C4 174ΩD)	174Ω,±0.5%,1/4W		
R13	MF,(NRN1/4C4 79.3ΩD)	79.3Ω,±0.5%,1/4W		
R14	MF,(NRN1/4C4 103.3ΩD)	103.3Ω,±0.5%,1/4W		
R15	MF,(NRN1/4C4 103.3ΩD)	103.3Ω,±0.5%,1/4W		
R16	MF,(NRN1/4C4 231ΩD)	231Ω,±0.5%,1/4W		
R17	MF,(NRN1/4C4 332ΩD)	332Ω,±0.5%,1/4W		
R18	MF,(NRN1/4C4 56.2ΩD)	56.2Ω,±0.5%,1/4W		
R19	MF,(NRN1/4C4 174ΩD)	174Ω,±0.5%,1/4W		
R20	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R21	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R22	MF,(NRN1/4C4 267ΩD)	267Ω,±0.5%,1/4W		
R23	CF,(ARD25T220J)	22Ω,±5%,1/4W		
R24	MF,(NRN1/4C4 50ΩD)	50Ω,±0.5%,1/4W		
R25	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R26	MF,(NRN1/4C4 26.7ΩD)	26.7Ω,±0.5%,1/4W		
R27	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R28	MF,(NRTF1/4C 33ΩJ)	33Ω,±5%,1/4W		
R29	CF,(ARD25R472J)	4.7kΩ,±5%,1/4W		
R30	Not assigned			
R31	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R32	CF,(ARD25G103J)	10kΩ,±5%,1/4W		
R33	CF,(ARD25T100J)	10Ω,±5%,1/4W		
R34	CF,(ARD25T100J)	10Ω,±5%,1/4W		
R35	CF,(ARD25T100J)	10Ω,±5%,1/4W		
R36	CF,(ARD25T680J)	68Ω,±5%,1/4W		
R37	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R38	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R39	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R40	Not assigned			
R41	CF,(ARD25T680J)	68Ω,±5%,1/4W		
R42	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R43	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R44	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R45	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R46	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R47	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R48	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R49	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R50	Not assigned			
R51	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R52	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R53	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R54	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R55	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

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Table 6-17 COMPONENT LIST OF IF MIX AND RETURN LOSS (Z5)

CKT REF	DESCRIPTION	RATING		NOTE
R56	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R57	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R58	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R59	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R60	Not assigned			
R61	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R62	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R63	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R64	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R65	MF,(NRN1/4C4 436ΩD)	436Ω,±0.5%,1/4W		
R66	MF,(NRN1/4C4 436ΩD)	436Ω,±0.5%,1/4W		
R67	MF,(NRN1/4C4 11.5ΩD)	11.5Ω,±0.5%,1/4W		
R68	MF,(NRN1/4C4 11.5ΩD)	11.5Ω,±0.5%,1/4W		
R69	CF,(ARD25T181J)	180Ω,±5%,1/4W		
R70	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R71	CF,(ARD25T330J)	33Ω,±5%,1/4W		
R72	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R73	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R74	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R75	CF,(ARD25T271J)	270Ω,±5%,1/4W		
R76	CF,(ARD25T271J)	270Ω,±5%,1/4W		
R77	CF,(ARD25T150J)	15Ω,±5%,1/4W		
R78	CF,(ARD25T150J)	15Ω,±5%,1/4W		
R79	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R80	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R81	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R82	CF,(ARD25T330J)	33Ω,±5%,1/4W		
R83	MF,(NRN1/4C4 439ΩD)	439Ω,±0.5%,1/4W		
R84	MF,(NRN1/4C4 439ΩD)	439Ω,±0.5%,1/4W		
R85	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R86	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R87	Not assigned			
R88	MF,(NRN1/4C4 75.0ΩD)	75Ω,±0.5%,1/4W		
R89	MF,(NRN1/4C4 56.2ΩD)	56.2Ω,±0.5%,1/4W		
R90	Not assigned			
R91	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R92	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R93	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R94	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R95	MF,(NRTF1/4C 15ΩJ)	15Ω,±5%,1/4W		
R96	MF,(NRTF1/4C 75.0ΩD)	75Ω,±0.5%,1/4W		
R97	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R98	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R99	Not assigned			
R100	Not assigned			

( ): Manufacturer's part number
* : Selected at factory

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Table 6-17 COMPONENT LIST OF IF MIX AND RETURN LOSS (Z5)

CKT REF	DESCRIPTION	RATING		NOTE
R101	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R102	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R103	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R104	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R105	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R106	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R107	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R108	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R109	Not assigned			
R110	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R111	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R112	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R113	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R114	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R115	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R116	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R117	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R118	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R119	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R120	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R121	MF,(NRTF1/4C 22ΩJ)	22Ω,±5%,1/4W		
R122	MF,(NRTF1/4C 50ΩJ)	50Ω,±5%,1/4W		
R123	CF,(ARD25T680J)	68Ω,±5%,1/4W		
R124	MF,(NRTF1/4C 330ΩJ)	330Ω,±5%,1/4W		
R125 to R146	Not assigned			
R147	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R148	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R149	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R150	Not assigned			
R151	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R152	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R153	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R154	CF,(ARD25T271J)	270Ω,±5%,1/4W		
R155	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R156	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R157	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R158	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R159	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R160	Not assigned			
R161	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R162	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R163	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R164	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R165	CF,(ARD25T101J)	100Ω,±5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

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Table 6-17 COMPONENT LIST OF IF MIX AND RETURN LOSS (Z5)

CKT REF	DESCRIPTION	RATING		NOTE
R166	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R167	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R168	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R169	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R170	Not assigned			
R171	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R172	CF,(ARD25T154J)	150kΩ,±5%,1/4W		
R173	Var,MF,(RJ-6P 100kΩ)	100kΩ,1/2W		
R174	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R175	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R176	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R177	CF,(ARD25T473J)	47kΩ,±5%,1/4W		
R178	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R179	Not assigned			
R180	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R181	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R182	MF,(RN14K2E9312D)	93.1kΩ,±0.5%,1/4W		
R183	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R184	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R185	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R186	MF,(RN14K2E6811D)	6.81kΩ,±0.5%,1/4W		
R187	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R188	Not assigned			
R189	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R190	Not assigned			
R191	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R192	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R193	CF,(ARD25T153J)	15kΩ,±5%,1/4W)		
R194	CR,(ARD25T153J)	15kΩ,±5%,1/4W		
R195	Not assigned			
R196	Not assigned			
R197	Not assigned			
R198	Not assigned			
R199	Var,MF,(RJ-6P 500kΩ)	500kΩ,1/2W		
R200	MF,(RN14K2E2211D)	2.21kΩ,±0.5%,1/4W		
R201	Not assigned			
R202	Var,WW,(442R42845)	60Ω		
R203	CF,(ARD25T6R8J)	6.8Ω,±5%,1/4W		
R204	MF,(RN14K2E2001D)	2kΩ,±0.5%,1/4W		
R205	Var,MF,(RJ-6P 20kΩ)	20kΩ,1/2W		
R206	Var,MF,(RJ-6P 500Ω)	500Ω,1/2W		
R207	Not assigned			
R208	CF,(ARD25T682J)	6.8kΩ,±5%,1/4W		
R209	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R210	Not assigned			

( ): Manufacturer's part number

* : Selected at factory

Table 6-17 COMPONENT LIST OF IF MIX AND RETURN LOSS (Z5)

CKT REF	DESCRIPTION	RATING		NOTE
R211	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R212	Thermistor,(OSD5-300-1)			
R213	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R214	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R215	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R216	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R217	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R218	MF,(NRTF1/4C 68ΩJ)	68Ω,±5%,1/4W		
R219	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R220	Not assigned			
R221	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R222	MF,(NRTF1/4C 68ΩJ)	68Ω,±5%,1/4W		
R223	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R224	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R225	MF,(NRN1/4C4 26.7ΩD)	26.7Ω,±0.5%,1/4W		
R226	MF,(NRN1/4C4 26.7ΩD)	26.7Ω,±0.5%,1/4W		
R227	MF,(NRN1/4C4 439ΩD)	439Ω,±0.5%,1/4W		
R228	MF,(NRN1/4C4 439ΩD)	439Ω,±0.5%,1/4W		
R229	MF,(NRN1/4C4 75ΩD)	75Ω,±0.5%,1/4W		
R230	Not assigned			
R231	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R232	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R233	MF,(NRN1/4C4 35.7ΩD)	35.7Ω,±0.5%,1/4W		
R234	MF,(NRTF1/4C 33ΩJ)	33Ω,±5%,1/4W		
R235	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R236	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R237	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R238	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R239	CF,(ARD25T202J)	2kΩ,±5%,1/4W		Q'ty 0 or 1, *
R240	Not assigned			
R241	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R242	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R243	Var,MF,(RJ-6P 500Ω)	500Ω,1/2W		
R244	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R245	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R246	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R247	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R248	Var,MF,(RJ-6P 500Ω)	500Ω,1/2W		
R249	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R250	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R251	CF,(ARD25T682J)	6.8kΩ,±5%,1/4W		
R252	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R253	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R254	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R255	Var,MF,(RJ-6P 1kΩ)	1kΩ,1/2W		

( ): Manufacturer's part number

* : Selected at factory

Table 6-17 COMPONENT LIST OF IF MIX AND RETURN LOSS (Z5)

CKT REF	DESCRIPTION	RATING		NOTE
R256	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R257	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R258	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R259	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R260	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R261	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R262	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R263	Var,MF,(RJ-6P 1kΩ)	1kΩ,1/2W		
R264	CF,(ARD25T331J)	330Ω,±5%,1/4W		Q'ty 0 or 1, *
R265	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R266	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R267	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R268	Var,MF,(RJ-6P 5kΩ)	5kΩ,1/2W		
R269	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R270	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R271	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R272	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R273	CF,(ARD25T121J)	120Ω,±5%,1/4W		
R274	CF,(ARD25T822J)	8.2kΩ,±5%,1/4W		
R275	Var,MF,(RJ-6P 5kΩ)	5kΩ,1/2W		
R276	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R277	CF,(ARD25T121J)	120Ω,±5%,1/4W		
R278	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R279	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R280	Not assigned			
R281	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R282	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R283	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R284	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R285	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R286	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R287	Not assigned			
R288	Not assigned			
R289	Var,MF,(RJ-6P 20kΩ)	20kΩ,1/2W		
R290	Not assigned			
R291	Not assigned			
R292	Not assigned			
R293	MF,(RN14K2E4021D)	4.02kΩ,±0.5%,1/4W		
R294	MF,(RN14K2E4221D)	4.22kΩ,±0.5%,1/4W		
R295	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R296	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R297	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R298	Var,MF,(RJ-6P 10kΩ)	10kΩ,1/2W		
R299	CF,(ARD25T822J)	8.2kΩ,±5%,1/4W		
R300	Not assigned			

( ): Manufacturer's part number

* : Selected at factory

Table 6-17 COMPONENT LIST OF IF MIX AND RETURN LOSS (Z5)

CKT REF	DESCRIPTION	RATING		NOTE
R301	MF,(RN14K2E2211D)	2.21kΩ,±0.5%,1/4W		
R302	Var,MF,(RJ-6P 500kΩ)	500kΩ,1/2W		
R303	Not assigned			
R304	Var,WW,(442R42845)	60Ω		
R305	CF,(ARD25T6R8J)	6.8Ω,±5%,1/4W		
R306	MF,(RN14K2E2001D)	2kΩ,±0.5%,1/4W		
R307	Var,MF,(RJ-6P 20kΩ)	20kΩ,1/2W		
R308	CF,(ARD25T473J)	47kΩ,±5%,1/4W		
R309	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R310	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R311	CF,(ARD25T682J)	6.8kΩ,±5%,1/4W		
R312	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R313	CF,(ARD25T100J)	10Ω,±5%,1/4W		
R314	Var,MF,(RJ-6P 500kΩ)	500kΩ,1/2W		
R315	Var,MF,(RJ-6P 500kΩ)	500kΩ,1/2W		
R316	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R317	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R318	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R319	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R320	CF,(ARD25T224J)	220kΩ,±5%,1/4W		
R321	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R322	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R323	Not assigned			
R324	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R325	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R326	CF,(ARD25T333J)	33kΩ,±5%,1/4W		
R327	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R328	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R329	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R330	Not assigned			
R331	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R332	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R333	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R334	CF,(ARD25T182J)	1.8kΩ,±5%,1/4W		
R335	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R336	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R337	MF,(RN14K2E25R5D)	25.5Ω,±0.5%,1/4W		
R338	MF,(RN14K2E4320D)	432Ω,±0.5%,1/4W		
R339	MF,(RN14K2E4320D)	432Ω,±0.5%,1/4W		
R340	Not assigned			
R341	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R342	Not assigned			
R343	Not assigned			
R344	Not assigned			
R345	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		

( ): Manufacturer's part number

* : Selected at factory

Table 6-17 COMPONENT LIST OF IF MIX AND RETURN LOSS (Z5)

CKT REF	DESCRIPTION	RATING		NOTE
R346	CF,(ARD25T684J)	680Ω,±5%,1/4W		
R347	MF,(NRN1/4C4 56.2ΩD)	56.2Ω,±0.5%,1/4W		
R348	CF,(ARD25T122J)	1.2kΩ,±5%,1/4W		
R349	MF,(NRN1/4C4 332ΩD)	332Ω,±0.5%,1/4W		
R350	MF,(NRTF1/4C 330ΩJ)	330Ω,±5%,1/4W		
R351	MF,(NRTF1/4C 47ΩJ)	47Ω,±5%,1/4W		
R352	MF,(NRTF1/4C 1.2kΩJ)	1.2kΩ,±5%,1/4W		
R353	CF,(ARD25T272J)	2.7kΩ,±5%,1/4W		
R354	CF,(ARD25T333J)	33kΩ,±5%,1/4W		
R355	CF,(ARD25T683J)	68kΩ,±5%,1/4W		
R356	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R357	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R358	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R359	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R360	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R361	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
T 1	Trans,(342T55677B)			
T 2	Trans,(342T55677B)			
Z 1	MIXER,(R & KM7)			
Z 2	MIXER,(R & KM7)			

( ): Manufacturer's part number
* : Selected at factory

Table 6-18 COMPONENT LIST OF MARKER AND SPECTRUM (Z6)

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer,(CC924CH1H150J)	15pF,±5%,50V		
C 2	Cer,(CC924CH1H120J)	12pF,±5%,50V		
C 3	Cer,(CC924CH1H150J)	15pF,±5%,50V		
C 4	Cer,(CC924CH1H101J)	100pF,±5%,50V		
C 5	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C 6	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C 7	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C 8	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C 9	Cer,(CC924CH1H100D)	10pF,±0.5pF,50V		ME538K/L/M
C10	Not assigned			
C11	Cer,(CC924CH1H100D)	10pF,±0.5pF,50V		ME538K/L/M
C12	Cer,(CC924CH1H150J)	15pF,±5%,50V		ME538K/L/M
C13	Cer,(CC924CH1H101J)	100pF,±5%,50V		ME538K/L/M
C14	Cer,(CK924C1H472M)	4700pF,±20%,50V		ME538K/L/M
C15	Cer,(CK924C1H472M)	4700pF,±20%,50V		ME538K/L/M
C16	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C17	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C18	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C19	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C20	Not assigned			
C21	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		
C22	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C23	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C24	Cer,(CC924CH1H680J)	68pF,±5%,50V		
C25	Cer,(CC924CH1H680J)	68pF,±5%,50V		
C26	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C27	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C28	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C29	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C30	Cer,(CC924CH1H470J)	47pF,±5%,50V		
C31	Not assigned			
C32	Not assigned			
C33	Elect,(CE04W1E470)	47μF,±20%,25V		
C34	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C35	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C36	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C37	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C38	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C39	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C40	Not assigned			
C41	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C42	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C43	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C44	Cer,(CC924CH1H680J)	68pF,±5%,50V		
C45	Cer,(CC924CH1H680J)	68pF,±5%,50V		

( ): Manufacturer's part number
* : Selected at factory

Table 6-18 COMPONENT LIST OF MARKER AND SPECTRUM (Z6)

CKT REF	DESCRIPTION	RATING		NOTE
C46	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C47	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C48	Elect,(CE04W1E470)	47μF,±20%,25V		
C49	Not assigned			
C50	Not assigned			
C51	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C52	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C53	Elect,(CE04W1A470)	47μF,±20%,10V		
C54	Cer,(CC924CH1H100D)	10pF,±0.5pF,50V		
C55	Cer,(CC924CJ1H030C)	3pF,±0.25pF,50V		
C56	Cer,(CC924CJ1H030C)	3pF,±0.25pF,50V		
C57	Cer,(CC924CH1H220J)	22pF,±5%,50V		
C58	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C59	Elect,(CE04W1A470)	47μF,±20%,10V		
C60	Not assigned			
C61	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C62	Cer,(CK924C1H222M)	2200pF,±20%,50V		
C63	Plast,(ECQ-M1H223KZ)	0.022μF,±10%,50V		
C64	Elect,(CE04W1J2R2)	2.2μF,±20%,63V		
C65	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C66	Elect,(CE04W1J2R2)	2.2μF,±20%,63V		
C67	Elect,(CE04W1J2R2)	2.2μF,±20%,63V		
C68	Cer,(CC924CH1H471J)	470pF,±5%,50V		
C69	Cer,(CC924CH1H471J)	470pF,±5%,50V		
C70	Not assigned			
C71	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C72	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C73	Not assigned			
C74	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C75	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C76	Plast,(ECQ-M1H332KZ)	3300pF,±10%,50V		
C77	Plast,(ECQ-M1H332KZ)	3300pF,±10%,50V		
C78	Elect,(CE04W1J2R2)	2.2μF,±20%,63V		
C79	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C80	Cer,(CC924CH1H470J)	47pF,±5%,50V		
C81	Elect,(CE04W1J2R2)	2.2μF,±20%,63V		
C82	Elect,(CE04W1J2R2)	2.2μF,±20%,63V		
C83	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C84	Elect,(CE04W1J2R2)	2.2μF,±20%,63V		
C85	Elect,(CE04W1J2R2)	2.2μF,±20%,63V		
C86	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C87	Plast,(ECQ-M1H223KZ)	0.022μF,±10%,50V		
C88	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C89	Plast,(ECQ-M1H332KZ)	3300pF,±10%,50V		
C90	Not assigned			

( ): Manufacturer's part number
* : Selected at factory

Table 6-18 COMPONENT LIST OF MARKER AND SPECTRUM (Z6)

CKT REF	DESCRIPTION	RATING		NOTE
C91	Plast,(ECQ-M1H333KZ)	0.033μF,±10%,50V		
C92	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C93	Not assigned			
C94	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C95	Elect,(CE04W1A470)	47μF,±20%,10V		
C96	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C97	Elect,(CE04W1A470)	47μF,±20%,10V		
C98	Elect,(CE04W1J010)	1μF,±20%,63V		
C99	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C100	Not assigned			
C101	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C102	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C103	Cer,(CC924CH1H200J)	20pF,±5%,50V		
C104	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C105	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C106	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C107	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C108	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C109	Cer,(CK924C1H222M)	2200pF,±20%,50V		
C110	Not assigned			
C111	Elect,(CE04W1V100)	10μF,±20%,35V		
C112	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C113	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C114	Cer,(CC924CH1H101J)	100pF,±5%,50V		
C115	Cer,(CC924CJ1H030C)	3pF,±0.25pF,50V		
C116	Cer,(CK924C1H222M)	2200pF,±20%,50V		
C117	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C118	Cer,(CK924C1H222M)	2200pF,±20%,50V		
C119	Cer,(CC924CH1H050D)	5pF,±0.5pF,50V		
C120	Cer,(CC924CH1H050D)	5pF,±0.5pF,50V		
C121	Cer,(CK924C1H472M)	0.047μF,±20%,50V		
C122	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C123	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C124	Elect,(CE04W1V220)	22μF,±20%,35V		
C125	Elect,(CE04W1V220)	22μF,±20%,35V		
C126	Elect,(CE04W1A470)	47μF,±20%,10V		
C127	Elect,(CE04W1A470)	47μF,±20%,10V		
C128	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C129	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C130	Not assigned			
C131	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C132	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C133	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C134	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C135	Cer,(CK924C1H104M)	0.1μF,±20%,50V		

( ): Manufacturer's part number
* : Selected at factory

Table 6-18 COMPONENT LIST OF MARKER AND SPECTRUM (Z6)

CKT REF	DESCRIPTION	RATING	NOTE
C136	Cer,(CK924C1H104M)	0.1μF,±20%,50V	
C137	Cer,(CC924CH1H070D)	7pF,±0.5pF,50V	
C138	Not assigned		
C139	Not assigned		
C140	Not assigned		
C141	Cer,(CK924C1H104M)	0.1μF,±20%,50V	
C142	Cer,(CK924C1H472M)	4700pF,±20%,50V	
C143	Cer,(CK924C1H472M)	4700pF,±20%,50V	
C144	Cer,(CK924C1H472M)	4700pF,±20%,50V	
C145	Cer,(CK924C1H104M)	0.1μF,±20%,50V	
C146	Cer,(CK924C1H104M)	0.1μF,±20%,50V	
C147	Cer,(CK924C1H104M)	0.1μF,±20%,50V	
C148	Cer,(CK924C1H104M)	0.1μF,±20%,50V	
C149	Cer,(CC924CH1H471J)	470pF,±5%,50V	
C150	Cer,(CC45UJ470JY)	47pF,±5%,50V	
C151	Cer,(CK924C1H102M)	1000pF,±20%,50V	
C152	Cer,(CK924C1H104M)	0.1μF,±20%,50V	
C153	Elect,(CE04W1E470)	47μF,±20%,25V	
C154	Cer,(CK924C1H472M)	4700pF,±20%,50V	
C155	Cer,(CK924C1H104M)	0.1μF,±20%,50V	
C156	Plast,(ECQ-P1 133FZ)	0.013μF,±1%,100V	
C157	Plast,(ECQ-P1 203FZ)	0.02μF,±1%,100V	
C158	Plast,(ECQ-P1 133FZ)	0.013μF,±1%,100V	
C159	Elect,(CE04W1V100)	10μF,±20%,35V	
C160	Elect,(CE04W1V220)	22μF,±20%,35V	
C161	Elect,(CE04W1V220)	22μF,±20%,35V	
C162	Elect,(CE04W1V100)	10μF,±20%,35V	
C163	Cer,(CK924C1H104M)	0.1μF,±20%,50V	
C164	Cer,(CC924CH1H470J)	47pF,±5%,50V	
C165	Cer,(CK924C1H104M)	0.1μF,±20%,50V	
C166	Cer,(CC924C1H471J)	470pF,±5%,50V	
C167	Cer,(CK924C1H104M)	0.1μF,±20%,50V	
C168	Elect,(CE04W1V100)	10μF,±20%,35V	
C169	Elect,(CE04W1V100)	10μF,±20%,35V	
C170	Elect,(CE04W1V100)	10μF,±20%,35V	
C171	Elect,(CE04W1V100)	10μF,±20%,35V	
C172	Cer,(CK924C1H104M)	0.1μF,±20%,50V	
C173	Cer,(CK924C1H104M)	0.1μF,±20%,50V	
C174	Cer,(CK924C1H104M)	0.1μF,±20%,50V	
C175	Cer,(CK914C1H104M)	0.1μF,±20%,50V	
C176	Cer,(CK924C1H104M)	0.1μF,±20%,50V	
J 1	Pattern		
J 2	Connector,(27DP-P-1.5)		

( ): Manufacturer's part number
* : Selected at factory

Table 6-18 COMPONENT LIST OF MARKER AND SPECTRUM (Z6)

CKT REF	DESCRIPTION	RATING	NOTE
J 3	Connector,(PI021-02F)		
J 4	Connector,(PI021-02M)		
J 5	Receptacle, (27DP-LR-PC)		
K 1	Relay,(NR-SD-12V)		ME538K/L/M
L 1	Coil,(442L71369E)		
L 2	Coil, (34L55686D10K17-5.5T)		
L 3	Coil,(LF8-221K)		
L 4	Coil,(442L71369F)		ME538K/L/M
L 5	Coil, (34L55686B10K17-3.5T)		ME538K/L/M
L 6	Coil,(LF8-100K)		
L 7	Coil,(SP0408-R33K)		
L 8	Coil,(SP0408-R33K)		
L 9	Coil,(SP0408-R33K)		
L10	Not assigned		
L11	Coil,(44T46070A)		
L12	Coil,(LF8-101K)		
L13	Coil,(LF8-101K)		
L14	Not assigned		
L15	Coil,(LF8-101K)		
L16	Coil,(LF8-101K)		
L17	Coil,(LF8-101K)		
L18	Coil,(LF8-101K)		
L19	Not assigned		
L20	Not assigned		
L21	Coil,(LF8-221K)		
L22	Coil,(FS0810-331K)		
L23	Coil,(FS0810-331K)		
L24	Coil,(LF8-101K)		
L25	Coil,(LF8-101K)		
L26	Coil,(LF8-101K)		
L27	Coil,(LF8-101K)		
L28	Coil,(LF8-221K)		
L29	Coil,(LF8-221K)		
L30	Not assigned		
L31	Coil,(LH1-472K)		
L32	Coil,(LH1-103K)		
L33	Coil,(LH1-103K)		
L34	Coil,(LF8-470K)		
L35	Coil,(LF8-470K)		

( ): Manufacturer's part number
* : Selected at factory

Table 6-18 COMPONENT LIST OF MARKER AND SPECTRUM (Z6)

CKT REF	DESCRIPTION	RATING		NOTE
L36	Coil,(LF8-470K)			
L37	Coil,(LF8-470K)			
L38	Coil,(SP0408-R47K)			
L39	Coil,(LF8-101K)			
L40	Coil,(LF8-101K)			
L41	Coil,(LF8-101K)			
L42	Coil,(LF8-221K)			
L43	Coil,(LH1-223K)			
L44	Coil,(LH1-223K)			
L45	Coil,(LF8-101K)			
L46	Coil,(LF8-101K)			
Q 1	Tr,(2SC1254)			
Q 2	Tr,(2SC1254)			
Q 3	Tr,(2SC1254)			ME538K/L/M
Q 4	Tr,(2SC1254)			ME538K/L/M
Q 5	Tr,(2SC2718)			ME538K/L/M
Q 6	Di,(1S953)			ME538K/L/M
Q 7	Tr,(2SC2901)			
Q 8	Tr,(2SC1252)			
Q 9	Tr,(2SC1252)			
Q10	Not assigned			
Q11	Not assigned			
Q12	Tr,(2SC2718)			
Q13	Tr,(2SC1254)			
Q14	Tr,(2SC1254)			
Q15	Di,(FC53M)			
Q16	Tr,(2SC1252)			
Q17	IC,(74LS00)			
Q18	Not assigned			
Q19	Not assigned			
Q20	Not assigned			
Q21	Not assigned			
Q22	Di,(1S953)			
Q23	Tr,(2SA711)			
Q24	Di,(1S953)			
Q25	Tr,(2SC2368)			
Q26	Tr,(2SC2368)			
Q27	Tr,(2SA1151)			
Q28	Tr,(2SC2718)			
Q29	IC,(UA733CN)			
Q30	Not assigned			
Q31	Di,(1S953)			
Q32	IC,(μPC177C)			
Q33	Tr,(2SC2718)			

( ): Manufacturer's part number
* : Selected at factory

Table 6-18 COMPONENT LIST OF MARKER AND SPECTRUM (Z6)

CKT REF	DESCRIPTION	RATING		NOTE
Q34	IC,(UA733CN)			
Q35	Di,(1S2222)			
Q36	IC,(UA733CN)			
Q37	Di,(1S953)			
Q38	Tr,(2SC2718)			
Q39	IC,(UA733CN)			
Q40	IC,(74LS74A)			
Q41	IC,(74S00)			
Q42	IC,(74S74)			
Q43	IC,(74LS293)			
Q44	IC,(μPC251C)			
Q45	Di,(1S953)			
Q46	IC,(74LS00)			
Q47	Tr,(2SC2718)			ME538K/L/M
Q48	Tr,(2SC2718)			ME538K/L/M
Q49	IC,(TC4066BP)			ME538K/L/M
Q50	Not assigned			
Q51	Di,breakdown,(RD9.1EB)	8.5 to 9.6V,400mW		
Q52	IC,(μPC251C)			
Q53	Tr,(2SC1728)			
Q54	Tr,(2SC2901)			
Q55	Tr,(2SC2901)			
Q56	Tr,(2SC2901)			
Q57	IC,(74LS00)			
Q58	Tr,(2SA1151)			
Q59	Tr,(2SC2901)			
Q60	Not assigned			
Q61	IC,(μPC157C)			
Q62	IC,(μPC251C)			
Q63	IC,(MC5157)			
Q64	Tr,(2SC2148)			
Q65	Tr,(2SC2148)			
Q66	Di,(1S953)			
Q67	IC,(HD10231)			
Q68	IC,(HD10125)			
Q69	IC,(74S74)			
Q70	IC,(74LS490)			
Q71	IC,(TC4053BP)			
Q72	IC,(HD74121)			
Q73	Di,breakdown,(RD3.9EB)	3.7 to 4.1V,400mW		
Q74	Tr,(2SA1151)			
Q75	IC,(μPC251C)			
Q76	Di,breakdown,(1SZ52)	5.9 to 6.5V,250mW		
Q77	IC,(μPC251C)			
Q78	IC,(μPC251C)			
Q79	IC,(μPC251C)			

( ): Manufacturer's part number
* : Selected at factory

Table 6-18 COMPONENT LIST OF MARKER AND SPECTRUM (Z6)

CKT REF	DESCRIPTION	RATING		NOTE
Q80	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q81	Di,breakdow (RD3.9EB)	3.7 to 4.1V,400mW		
Q82	IC,(74LS290)			
Q83	IC,(74LS00)			
Q84	IC,(74LS32)			
Q85	IC,(74LS74A)			
Q86	IC,(74LS04)			
Q87	IC,(74LS293)			
Q88	IC,(74LS490)			
Q89	IC,(74LS490)			
Q90	IC,(74LS74A)			
Q91	IC,(TC4053BP)			
Q92	Di,(1S953)			
Q93	Di,(IS953)	4.8 to 5.4V,500mW		
Q94	Di,breakdown,(RD5.1EB)			
Q95	Tr,(2SA1151)			
Q96	Tr,(2SA1151)			
Q97	IC,(uPC251C)			
Q98	Di,(1S953)			
Q99	Di,(1S953)			
Q100	Tr,(2SC2718)			
R 1	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R 2	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R 3	CF,(ARD25T272J)	2.7kΩ,±5%,1/4W		
R 4	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R 5	CF,(ARD25T473J)	47kΩ,±5%,1/4W)		
R 6	CF,(ARD25T473J)	47kΩ,±5%,1/4W		
R 7	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R 8	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R 9	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R10	Not assigned			
R11	CF,(ARD25T122J)	1.2kΩ,±5%,1/4W		
R12	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R13	CF,(ARD25T473J)	47kΩ,±5%,1/4W		
R14	CF,(ARD25T473J)	47kΩ,±5%,1/4W		
R15	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R16	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R17	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R18	CF,(ARD25T680J)	68Ω,±5%,1/4W		
R19	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R20	Not assigned			
R21	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R22	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R23	CF,(ARD25T221J)	220Ω,±5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-18 COMPONENT LIST OF MARKER AND SPECTRUM (Z6)

CKT REF	DESCRIPTION	RATING		NOTE
R24	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R25	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R26	CF,(ARD25T271J)	270Ω,±5%,1/4W		
R27	CF,(ARD25T271J)	270Ω,±5%,1/4W		
R28	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R29	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R30	Not assigned			
R31	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R32	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R33	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R34	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R35	Not assigned			
R36	Not assigned			
R37	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R38	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R39	CF,(ARD25T680J)	68Ω,±5%,1/4W		
R40	Not assigned			
R41	CF,(ARD25T680J)	68Ω,±5%,1/4W		
R42	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R43	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R44	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R45	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R46	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R47	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R48	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R49	CF,(ARD25T271J)	270Ω,±5%,1/4W		
R50	Not assigned			
R51	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R52	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R53	CF,(ARD25T680J)	68Ω,±5%,1/4W		
R54	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R55	Not assigned			
R56	Not assigned			
R57	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R58	CF,(ARD25T561J)	560Ω,±5%,1/4W		
R59	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R60	Not assigned			
R61	CF,(ARD25T561J)	560Ω,±5%,1/4W		
R62	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R63	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R64	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R65	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R66	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R67	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R68	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R69	CF,(ARD25T102J)	1kΩ,±5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-18 COMPONENT LIST OF MARKER AND SPECTRUM (Z6)

CKT REF	DESCRIPTION	RATING		NOTE
R70	Not assigned			
R71	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R72	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R73	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R74	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R75	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R76	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R77	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R78	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R79	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R80	Not assigned			
R81	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R82	CF,(ARD25T182J)	1.8kΩ,±5%,1/4W		
R83	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R84	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R85	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R86	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R87	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R88	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R89	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R90	Not assigned			
R91	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R92	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R93	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R94	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R95	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R96	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R97	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R98	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R99	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R100	Not assigned			
R101	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R102	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R103	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R104	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R105	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R106	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R107	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R108	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R109	CF,(ARD25T182J)	1.8kΩ,±5%,1/4W		
R110	Not assigned			
R111	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R112	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R113	CF,(ARD25T680J)	68Ω,±5%,1/4W		
R114	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R115	CF,(ARD25T750J)	75Ω,±5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-18 COMPONENT LIST OF MARKER AND SPECTRUM (Z6)

CKT REF	DESCRIPTION	RATING		NOTE
R116	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R117	CF,(ARD25T510J)	51Ω,±5%,1/4W		
R118	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R119	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R120	Not assigned			
R121	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R122	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R123	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R124	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R125	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R126	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R127	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R128	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R129	CF,(ARD25T822J)	8.2kΩ,±5%,1/4W		
R130	Not assigned			
R131	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R132	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R133	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R134	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R135	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R136	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R137	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R138	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R139	Var,MF,(RJ-6S 100kΩ)	100kΩ,1/2W		ME538
R140	Not assigned			
R141	Var,MF,(RJ-6S 100kΩ)	100kΩ,1/2W		
R142	Var,MF,(RJ-6S 10kΩ)	10kΩ,1/2W		
R143	Var,MF,(RJ-6S 10kΩ)	10kΩ,1/2W		
R144	CF,(ARD25T391J)	390Ω,±5%,1/4W		
R145	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R146	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R147	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R148	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R149	Not assigned			
R150	Not assigned			
R151	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R152	CF,(ARD25T272J)	2.7kΩ,±5%,1/4W		
R153	CF,(ARD25T561J)	560Ω,±5%,1/4W		
R154	CF,(ARD25T561J)	560Ω,±5%,1/4W		
R155	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R156	CF,(ARD25T561J)	560Ω,±5%,1/4W		
R157	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R158	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R159	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R160	Not assigned			

( ): Manufacturer's part number
* : Selected at factory

Table 6-18 COMPONENT LIST OF MARKER AND SPECTRUM (Z6)

CKT REF	DESCRIPTION	RATING		NOTE
R161	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R162	CF,(ARD25T561J)	560Ω,±5%,1/4W		
R163	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R164	CF,(ARD25T561J)	560Ω,±5%,1/4W		
R165	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R166	CF,(ARD25T561J)	560Ω,±5%,1/4W		
R167	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R168	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R169	CF,(ARD25T333J)	33kΩ,±5%,1/4W		
R170	Not assigned			
R171	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R172	Var,MF,(RJ-6S 1kΩ)	1kΩ,1/2W		
R173	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R174	CF,(ARD25T333J)	33kΩ,±5%,1/4W		
R175	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R176	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R177	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R178	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R179	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R180	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R181	Not assigned			
R182	Not assigned			
R183	MF,(NRTF1/8C 330ΩK)	330Ω,±10%,1/8W		
R184	MF,(NRTF1/8C 330ΩK)	330Ω,±10%,1/8W		
R185	MF,(NRTF1/8C 15ΩK)	15Ω,±10%,1/8W		
R186	MF,(NRTF1/8C 22ΩK)	22Ω,±10%,1/8W		
R187	CF,(ARD25T182J)	1.8kΩ,±5%,1/4W		
R188	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R189	MF,(NRTF1/8C 68ΩK)	68Ω,±10%,1/8W		
R190	MF,(NRTF1/8C 68ΩK)	68Ω,±10%,1/8W		
R191	MF,(NRTF1/8C 22ΩK)	22Ω,±10%,1/8W		
R192	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R193	CF,(ARD25T182J)	1.8kΩ,±5%,1/4W		
R194	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R195	MF,(NRTF1/8C 10ΩK)	10Ω,±10%,1/8W		
R196	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R197	MF,(NRTF1/8C 510ΩK)	510Ω,±10%,1/8W		
R198	MF,(NRTF1/8C 510ΩK)	510Ω,±10%,1/8W		
R199	MF,(NRTF1/8C 510ΩK)	510Ω,±10%,1/8W		
R200	MF,(NRTF1/8C 510ΩK)	510Ω,±10%,1/8W		
R201	MF,(RN14K2E4991D)	4.99kΩ,±0.5%,1/4W		
R202	MF,(RN14K2E2871D)	2.87kΩ,±0.5%,1/4W		
R203	MF,(RN14K2E3401D)	3.4kΩ,±0.5%,1/4W		
R204	MF,(RN14K2E1001D)	1kΩ,±0.5%,1/4W		
R205	MF,(RN14K2E1002D)	10kΩ,±0.5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-18 COMPONENT LIST OF MARKER AND SPECTRUM (Z6)

CKT REF	DESCRIPTION	RATING		NOTE
R206	MF,(RN14K2E3401D)	3.4kΩ,±0.5%,1/4W		
R207	MF,(RN14K2E3401D)	3.4kΩ,±0.5%,1/4W		
R208	MF,(RN14K2E2491D)	2.49kΩ,±0.5%,1/4W		
R209	MF,(RN14K2E2211D)	2.21kΩ,±0.5%,1/4W		
R210	Var,MF,(RJ-6P 1kΩ)	1kΩ,1/2W		
R211	MF,(RN14K2E1501D)	1.5kΩ,±0.5%,1/4W		
R212	MF,(RN14K2E1501D)	1.5kΩ,±0.5%,1/4W		
R213	MF,(RN14K2E3012D)	30.1kΩ,±0.5%,1/4W		
R214	MF,(RN14K2E1003D)	100kΩ,±0.5%,1/4W		
R215	MF,(RN14K2E5112D)	51.1kΩ,±0.5%,1/4W		
R216	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R217	MF,(RN14K2E1003D)	100kΩ,±0.5%,1/4W		
R218	MF,(RN14K2E1002D)	10kΩ,±0.5%,1/4W		
R219	MF,(RN14K2E5112D)	51.1kΩ,±0.5%,1/4W		
R220	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R221	CF,(ARD25T473J)	47kΩ,±5%,1/4W		
R222	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R223	MF,(RN14K2E1002D)	10kΩ,±0.5%,1/4W		
R224	MF,(RN14K2E1002D)	10kΩ,±0.5%,1/4W		
R225	MF,(RN14K2E1002D)	10kΩ,±0.5%,1/4W		
R226	MF,(RN14K2E1002D)	10kΩ,±0.5%,1/4W		
R227	MF,(RN14K2E2492D)	24.9kΩ,±0.5%,1/4W		
R228	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R229	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R230	MF,(RN14K2E2002D)	20kΩ,±0.5%,1/4W		
R231	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R232	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R233	CF,(ARD25T682J)	6.8kΩ,±5%,1/4W		
R234	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R235	CF,(ARD25T683J)	68kΩ,±5%,1/4W		
R236	CF,(ARD25T683J)	68kΩ,±5%,1/4W		
R237	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R238	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R239	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R240	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R241	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R242	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R243	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R244	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R245	CF,(ARD25T333J)	33kΩ,±5%,1/4W		
R246	Not assigned			
R247	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R248	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R249	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R250	CF,(ARD25T103J)	10kΩ,±5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-18 COMPONENT LIST OF MARKER AND SPECTRUM (Z6)

CKT REF	DESCRIPTION	RATING		NOTE
R251	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R252	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R253	CF,(ARD25T473J)	47kΩ,±5%,1/4W		
R254	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R255	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R256	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R257	Var,MF,(RJ-6P1kΩ)	1kΩ,±1/2W		
T 1	Trans,(342T55677B)			
X 1	XTAL OSC,(44x71111C)	87.78MHz		
X 2	XTAL OSC,(44x71111D)	122.220MHz		ME538[illegible]
X 3	XTAL OSC,(44x64091B)	17.78MHz		
Z 1	MIXER,(R & KM1)			
Z 2	MIXER,(R & KM1)			
Z 3	MIXER,(R & KM1)			

( ). Manufacturer's part number
* : Selected at factory

Table 6-19 COMPONENT LIST OF CPU (Z7)

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer,(CC924CH1H150J)	15pF,±5%,50V		
C 2	Cer,(CC924CH1H220J)	22pF,±5%,50V		
C 3	Elect,(CE04W1V220)	22μF,±20%,35V		
C 4	Plast,(FNX-HS 1003-105K)	1μF,±10%,100V		
C 5	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C 6	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V		
C 7	Plast,(ECQ-M1H223KZ)	0.022μF,±10%,50V		
C 8	Cer,(CC924CH1H101J)	100pF,±5%,50V		
C 9	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C10	Not assigned			
C11	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C12	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C13	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C14	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C15	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C16	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C17	Not assigned			
C18	Not assigned			
C19	Not assigned			
C20	Not assigned			
C21	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C22	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C23	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C24	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C25	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C26	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C27	Not assigned			
C28	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C29	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C30	Not assigned			
C31	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C32	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C33	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C34	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C35	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C36	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C37	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C38	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C39	Not assigned			
C40	Not assigned			
C41	Elect,(CE04W1A470)	47μF,±20%,10V		
C42	Elect,(CE04W1A470)	47μF,±20%,10V		
C43	Elect,(CE04W1A470)	47μF,±20%,10V		
C44	Not assigned			
C45	Elect,(CE04W1V220)	22μF,±20%,35V		

( ): Manufacturer's part number
* : Selected at factory

Table 6-19 COMPONENT LIST OF CPU (Z7)

CKT REF	DESCRIPTION	RATING		NOTE
C46	Elect,(CE04W1V220)	22μF,±20%,35V		
C47	Not assigned			
C48	Not assigned			
C49	Not assigned			
C50	Not assigned			
C51	Not assigned			
C52	Not assigned			
C53	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C54	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C55	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C56	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C57	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C58	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
J 1	Plug,(pattern)			
J 2	Plug, (HIF3-34P-2.54DS)			
J 3	Plug, (HIF3-50P-2.54DS)			
J 4	Connector,(U-PA2221)	22 pins		
J 5	Connector,(U-PA1521)	15 pins		
J 6	Connector,(U-PA2221)	22 pins		
J 7	Connector,(U-PA1521)	15 pins		
J 8	Connector,(PI021-2M)			
Q 1	IC,(μPD8085AC)	40 pins		
Q 2	IC,(EPROM16KX8-25N)	28 pins		
Q 3	Not assigned			
Q 4	Not assigned			
Q 5	IC,(HM6116P-3)			
Q 6	Not assigned			
Q 7	IC,(74LS373)			
Q 8	IC,(74LS367)			
Q 9	IC,(74LS367)			
Q10	Not assigned			
Q11	Not assigned			
Q12	IC,(74154)			
Q13	IC,(TC40H138P)			
Q14	IC,(74154)			
Q15	IC,(μPD8279C-5)			
Q16	IC,(TC4508BP)			
Q17	IC,(μPD8253C-5)			
Q18	IC,(ICL7109CPL)			
Q19	IC,(TC4051BP)			
Q20	Not assigned			

( ): Manufacturer's part number
* : Selected at factory

Table 6-19 COMPONENT LIST OF CPU (Z7)

CKT REF	DESCRIPTION	RATING		NOTE
Q21	Not assigned			
Q22	IC,(TC40H174P)			
Q23	IC,(74LS373)			
Q24	IC,(TC4508BP)			
Q25	IC,(TC4508BP)			
Q26	IC,(TC4508BP)			
Q27	IC,(TC4508BP)			
Q28	Not assigned			
Q29	IC,(7406)			
Q30	Not assigned			
Q31	IC,(TC40H367P)			
Q32	IC,(TC40H367P)			
Q33	IC,(TC40H367P)			
Q34	IC,(TC40H174P)			
Q35	IC,(74LS367)			
Q36	Not assigned			
Q37	Not assigned			
Q38	IC,(74LS04)			
Q39	IC,(TC40H004P)			
Q40	IC,(TC40H004P)			
Q41	Not assigned			
Q42	IC,(TC40H032P)			
Q43	IC,(74LS32)			
Q44	Not assigned			
Q45	Di,(1S953)			
Q46	IC,(TC40H008P)			
Q47	IC,(TC40H259P)			
Q48	Not assigned			
Q49	Not assigned			
Q50	Not assigned			
Q51	Not assigned			
Q52	Not assigned			
Q53	Not assigned			
Q54	Not assigned			
Q55	Di,breakdown,(RD7.5EB)	7.0 to 7.9V,400mW		
Q56	Di,breakdown,(RD7.5EB)	7.0 to 7.9V,400mW		
Q57	Not assigned			
Q58	IC,(74LS244)			
Q59	IC,(74LS244)			
Q60	IC,(TC40H008P)			
Q61	IC,(TC40H244P)			
R 1	Not assigned			
R 2	CF,(ARD25T473J)	47kΩ,±5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-19 COMPONENT LIST OF CPU (Z7)

CKT REF	DESCRIPTION	RATING		NOTE
R 3	Not assigned			
R 4	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R 5	MF,(RN14K2E1003D)	100kΩ,±0.5%,1/4W		
R 6	MF,(RN14K2E1003D)	100kΩ,±0.5%,1/4W		
R 7	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R 8	MF,(RN14K2E4991D)	4.99kΩ,±0.5%,1/4W		
R 9	Var,MF,(RJ-6S 20kΩ)	20kΩ,1/2W		
R10	Not assigned			
R11	Not assigned			
R12	Not assigned			
R13	Not assigned			
R14	Single in-line array, (IHR-8-223JA)	22kΩ x 8,1/8W		
R15	Not assigned			
R16	CF,(ARD25T153J)	15kΩ,±5%,1/4W		
R17	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R18	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R19	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R20	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
X 1	Oscillator,(NC-18C 4MHz)			

( ): Manufacturer's part number
* : Selected at factory

Table 6-20 COMPONENT LIST OF MOTHER BOARD (Z9)

CKT REF	DESCRIPTION	RATING		NOTE
J 1	Connector, (225J-2221-587)			
J 2	Connector, (225J-2221-587)			
J 3	Connector, (225J-2221-587)			
J 4	Connector, (225J-2221-587)			
J 5	Connector, (225J-2221-587)			
J 6	Connector, (225J-2221-587)			
J 7	Connector, (225J-2221-587)			
J 8	Not assigned			
J 9	Connector, (HIF23A-40D-AA30S)			
J10	Connector, (HIF23-30D-AA20S)			
J11	Connector,(U-PA1019)			
J12	Connector, (DF1-15P2.5DS)			

( ): Manufacturer's part number
* : Selected at factory

Table 6-21 COMPONENT LIST OF OPERATING/LED BOARD (Z10)

CKT REF	DESCRIPTION	RATING		NOTE
J 1	Cable connector, (HIF23A-60D-AA30S)	60 p		
J 2	Cable connector, (CNF23A-30D-AA30S)	30 p		
Q 1 to Q19	LED,(LN513GK)			
Q20	Not assigned			
Q21	Not assigned			
Q22	Not assigned			
Q23	LED,(LN38GP)			
Q24	Not assigned			
Q25	LED,(LN38GP)			
Q26	Not assigned			
Q27 to Q39	LED,(LN38GP)			
Q40	Not assigned			
Q41	LED,(LN38GP)			
Q42	Not assigned			
Q43	LED,(LN38GP)			
Q44	Not assigned			
Q45 to Q66	LED,(LN38GP)			
Q67	Not assigned			
Q68	Not assigned			
Q69	Not assigned			
Q70	LED,(LN38GP)			
Q71	LED,(LN38GP)			
Q72	LED,(LN38GP)			
Q73	LED,(LN38GP)			
Q74	LED,(LN38GP)			
Q75	LED,(LN38GP)			
Q76	Not assigned			
Q77	Not assigned			
Q78	Not assigned			
Q79	LED,(LN38GP)			
Q80	LED,(LN38GP)			
Q81	LED,(LN38GP)			
Q82	LED,(LN38GP)			
Q83	LED,(LN38GP)			
Q84	LED,(LN38GP)			
Q85	Not assigned			
Q86	Not assigned			

( ): Manufacturer's part number
* : Selected at factory

Table 6-21 COMPONENT LIST OF OPERATING/LED BOARD (Z10)

CKT REF	DESCRIPTION	RATING		NOTE
Q87	Not assigned			
Q88	Not assigned			
Q89	Not assigned			
Q90	Not assigned			
Q91 to Q102	LED,(TLG226)			
Q103	Not assigned			
Q104	LED,(LN342GPH)			
Q105	LED,(LN342GPH)			
Q106	Not assigned			
Q107	LED,(LN38GP)			
Q108	LED,(LN38GP)			
Q109	LED,(LN38GP)			
Q110	LED,(LN38GP)			
Q111	LED,(LN38GP)			
Q112	LED,(LN38GP)			
Q113	LED,(TLG226)			
Q114	LED,(TLG226)			
Q115	LED,(TLY226)			
Q116	LED,(TLG226)			
R 1	Var,MF,(RG161N20SB 10kΩM)	10kΩ,1/2W		
R 2	Not assigned			
R 3	Not assigned			
R 4	PMTR,WW,(20HP-5S 50kΩ)	50kΩ		
R 5	Var,MF,(RG161N20SB 10kΩM)	10kΩ,1/2W		
R 6	Var,MF,(RG161N20SB 10kΩM)	10kΩ,1/2W		
R 7	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R 8	CF,(ARD25T330J)	33Ω,±5%,1/4W		
R 9	CF,(ARD25T330J)	33Ω,±5%,1/4W		
R10	CF,(ARD25T330J)	33Ω,±5%,1/4W		
R11	CF,(ARD25T330J)	33Ω,±5%,1/4W		
R12	CF,(ARD25T330J)	33Ω,±5%,1/4W		
R13	CF,(ARD25T680J)	68Ω,±5%,1/4W		
R14	CF,(ARD25T680J)	68Ω,±5%,1/4W		
R15	CF,(ARD25T680J)	68Ω,±5%,1/4W		
R16	CF,(ARD25T680J)	68Ω,±5%,1/4W		
R17	CF,(ARD25T680J)	68Ω,±5%,1/4W		
R18	CF,(ARD25T680J)	68Ω,±5%,1/4W		
R19	CF,(ARD25T330J)	33Ω,±5%,1/4W		
R20	CF,(ARD25T101J)	100Ω,±5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-21 COMPONENT LIST OF OPERATING/LED BOARD (Z10)

CKT REF	DESCRIPTION	RATING		NOTE
R21	Not assigned			
R22	Not assigned			
R23	Not assigned			
R24	CF,(ARD25T680J)	68Ω,±5%,1/4W		
R25	CF,(ARD25T680J)	68Ω,±5%,1/4W		
R26	CF,(ARD25T680J)	68Ω,±5%,1/4W		
R27	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R28	CF,(ARD25T331J)	330Ω,±5%,1/4W		
S 1	Yellow green switch, (HL20-LSYG)			
S 2	Yellow green switch, (HL20-LSYG)			
S 3	Yellow green switch, (HL20-LSYG)			
S 4	Yellow green switch, (HL20-LSYG)			
S 5	Yellow green switch, (HL20-LSYG)			
S 6 to S21	Yellow green switch (HL20-LSYG)			
S22	Not assigned			
S23	Slide switch, (SL7-4(PH)8H6-2-2)			ME538
S24	Not assigned			
S25	Yellow green switch (HL20-LSYG)			
S26	Yellow green switch (HL20-LSYG)			
S27	Yellow green switch (HL20-LSYG)			

( ): Manufacturer's part number
* : Selected at factory

Table 6-22 COMPONENT LIST OF LED DRIVER (Z11)

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Elect,(CE04W1A471)	470μF,±20%,10V		
C 2	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C 3	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C 4	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C 5	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C 6	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C 7	Plast,(ECQ-M1H472KZ)	4700pF,±20%,50V		
C 8	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V		
C 9	Plast,(ECQ-M1H102KZ)	1000pF,±10%,50V		
C10	Plast,(ECQ-M1H102KZ)	1000pF,±10%,50V		
C11	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		
C12	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		
C13	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		
C14	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		
C15	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		
C16	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		
C17	Elect,(CE04W1A470)	47μF,±20%,10V		
C18	Not assigned			
C19	Cer,(CC924CH1H470J)	47pF,±5%,50V		
C20	Cer,(CC924CH1H470J)	47pF,±5%,50V		
C21	Cer,(CC924CH1H470J)	47pF,±5%,50V		
C22	Cer,(CC924CH1H470J)	47pF,±5%,50V		
C23	Cer,(CC924CH1H470J)	47pF,±5%,50V		
C24	Cer,(CC924CH1H470J)	47pF,±5%,50V		
C25	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C26	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
J 1	Connector, (HIF3-60P-2.54DSA)	60 pins		
J 2	Connector, (HIF3-30P-2.54DSA)	30 pins		
J 3	Connector, (HIF3-50P-2.54DSA)	50 pins		
J 4	Connector, (HIF3-40P-2.54DSA)	40 pins		
J 5	Connector,(PI011-02M)	2 pins		
Q 1	IC,(74LS156)			
Q 2	IC,(74LS138)			
Q 3	IC,(74LS174)			
Q 4	IC,(74LS174)			
Q 5	IC,(74LS174)			
Q 6	IC,(74LS174)			
Q 7	IC,(74LS75)			

( ): Manufacturer's part number
* : Selected at factory

Table 6-22 COMPONENT LIST OF LED DRIVER (Z11)

CKT REF	DESCRIPTION	RATING		NOTE
Q 8	IC,(TC4514BP)			
Q 9	IC,(TD62004P)			
Q10	IC,(TD62004P)			
Q11	IC,(TD62004P)			
Q12	IC,(TD62004P)			
Q13	IC,(μPA56C)			
Q14	IC,(2SC2718)			
Q15	IC,(74LS247)			
Q16	IC,(μPA56C)			
Q17	IC,(7407)			
Q18	IC,(7407)			
Q19	IC,(7407)			
Q20	IC,(7407)			
Q21	IC,(74LS04)			
Q22	IC,(7406)			
Q23	IC,(7406)			
Q24	Not assigned			
Q25	IC,(74LS74A)			
Q26	IC,(74LS04)			
Q27	IC,(74LS00)			
Q28	IC,(TC5032P)			
Q29	IC,(74LS248)			
Q30	IC,(μPA56C)			
Q31	IC,(74LS04)			
Q32	IC,(TD62003P)			
Q33	IC,(TC4050BP)			
Q34	IC,(74LS148)			
Q35	IC,(74LS74A)			
R 1	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R 2	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R 3	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R 4	CF,(ARD25T820J)	82Ω,±5%,1/4W		
R 5	CF,(ARD25T820J)	82Ω,±5%,1/4W		
R 6	CF,(ARD25T820J)	82Ω,±5%,1/4W		
R 7	CF,(ARD25T820J)	82Ω,±5%,1/4W		
R 8	CF,(ARD25T820J)	82Ω,±5%,1/4W		
R 9	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R10	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R11	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R12	CF,(ARD25T820J)	82Ω,±5%,1/4W		
R13	CF,(ARD25T820J)	82Ω,±5%,1/4W		
R14	CF,(ARD25T820J)	82Ω,±5%,1/4W		
R15	CF,(ARD25T820J)	82Ω,±5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-22 COMPONENT LIST OF LED DRIVER (Z11)

CKT REF	DESCRIPTION	RATING		NOTE
R16	CF,(ARD25T150J)	15Ω,±5%,1/4W		
R17	CF,(ARD25T150J)	15Ω,±5%,1/4W		
R18	CF,(ARD25T150J)	15Ω,±5%,1/4W		
R19	CF,(ARD25T150J)	15Ω,±5%,1/4W		
R20	CF,(ARD25T820J)	82Ω,±5%,1/4W		
R21	CF,(ARD25T820J)	82Ω,±5%,1/4W		
R22	Single in-line array, (IHR-4-104JA)	100kΩ x 4,1/8W		
R23	Not assigned			
R24	Not assigned			
R25	Not assigned			
R26 to R53	CF,(ARD25T4R7J)	4.7Ω,±5%,1/4W		
R54	Single in-line array, (IHR-8-222JA)	2.2kΩ x 8,1/8W		
R55	Not assigned			
R56	Not assigned			
R57	Not assigned			
R58	Not assigned			
R59	Not assigned			
R60	Not assigned			
R61	CF,(ARD25T220J)	22Ω,±5%,1/4W		
R62	CF,(ARD25T220J)	22Ω,±5%,1/4W		
R63	CF,(ARD25T220J)	22Ω,±5%,1/4W		
R64	CF,(ARD25T220J)	22Ω,±5%,1/4W		
R65	CF,(ARD25T220J)	22Ω,±5%,1/4W		
R66	CF,(ARD25T220J)	22Ω,±5%,1/4W		
R67	CF,(ARD25T680J)	68Ω,±5%,1/4W		
R68	Single in-line array, (IHR-8-222JA)	2.2kΩ x 8,1/8W		
R69	Not assigned			
R70	Not assigned			
R71	Not assigned			
R72	Not assigned			
R73	Not assigned			
R74	Not assigned			
R75	CF,(ARD25T820J)	82Ω,±5%,1/4W		
R76	CF,(ARD25T820J)	82Ω,±5%,1/4W		
R77	CF,(ARD25T820J)	82Ω,±5%,1/4W		
R78	CF,(ARD25T820J)	82Ω,±5%,1/4W		
R79	CF,(ARD25T820J)	82Ω,±5%,1/4W		
R80	CF,(ARD25T820J)	82Ω,±5%,1/4W		
R81	CF,(ARD25T820J)	82Ω,±5%,1/4W		
R82	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-22 COMPONENT LIST OF LED DEIVER (Z11)

CKT REF	DESCRIPTION	RATING		NOTE
R83	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R84	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R85	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R86	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R87	CF,(ARD25T131J)	130Ω,±5%,1/4W		
R88	CF,(ARD25T131J)	130Ω,±5%,1/4W		
R89	CF,(ARD25T131J)	130Ω,±5%,1/4W		
R90	CF,(ARD25T131J)	130Ω,±5%,1/4W		
R91	CF,(ARD25T131J)	130Ω,±5%,1/4W		
R92	CF,(ARD25T131J)	130Ω,±5%,1/4W		
R93	CF,(ARD25T131J)	130Ω,±5%,1/4W		
R94	Not assigned			
R95	Not assigned			
R96	Not assigned			
R97	Not assigned			
R98	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R99	Not assigned			
R100	Single in-line array, (IHR-6-104JA)	100kΩ x 6,1/8W		
R101	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R102	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R103	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R104	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R105	CF,(ARD25T100J)	10Ω,±5%,1/4W		
R106	Not assigned			
R107	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-23 COMPONENT LIST OF X SELECT, X-Y RECORDER (Z12)

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V		
C 2	Plast,(ECQ-M1H473KZ)	0.047μF,±10%,50V		
C 3	Elect,(CE04W1E470)	47μF,±20%,25V		
C 4	Elect,(CE04W1E470)	47μF,±20%,25V		
C 5	Elect,(CE04W1E470)	47μF,±20%,25V		
C 6	Elect,(CE04W1E470)	47μF,±20%,25V		
C 7	Not assigned			
C 8	Not assigned			
C 9	Plast,(ECQ-M1H223KZ)	0.022μF,±10%,50V		
C10	Plast,(ECQ-M1H222KZ)	2200pF,±10%,50V		
C11	Plast,(ECQ-M1H222KZ)	2200pF,±10%,50V		
C12	Plast, (ECQ-M1H332KZ)	3300pF,±10%,50V		
C13	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		
C14	Cer,(CC924CH1H101J)	100pF,±5%,50V		
C15	Plast,(ECQ-M1H104KZ)	0.1μF,±10%,50V		
C16	Plast,(ECQ-M1H104KZ)	0.1μF,±10%,50V		
C17	Cer,(RPE113C474K50)	0.47μF,±10%,50V		
C18	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		
C19	Plast,(ECQ-M1H104KZ)	0.1μF,±10%,50V		
C20	Plast,(ECQ-M1H104KZ)	0.1μF,±10%,50V		
C21	Elect,(CE04W1E101)	100μF,±20%,25V		
C22	Elect,(CE04W1E101)	100μF,±20%,25V		
C23	Plast,(ECQ-M1H104KZ)	0.1μF,±10%,50V		
C24	Plast,(ECQ-M1H104KZ)	0.1μF,±10%,50V		
C25	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V		
C26	Plast,(ECQ-M1H104KZ)	0.1μF,±10%,50V		
C27	Plast,(ECQ0M1H104KZ)	0.1μF,±10%,50V		
C28	Plast,(ECQ-M1H102KZ)	1000pF,±10%,50V		
C29	Not assigned			
C30	Not assigned			
C31	Elect,(CE04W1V220)	22μF,±20%,35V		
C32	Elect,(CE04W1V220)	22μF,±20%,35V		
C33	Elect,(CE04W1V220)	22μF,±20%,35V		
C34	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		
C35	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		
C36	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		
C37	Plast,(ECQ-M1H472KZ)	4700pF,±10%,50V		
C38	Elect,(CE04W1V220)	22μF,±20%,35V		
C39	Elect,(CE04W1V100)	10μF,±20%,35V		
C40	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C41	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C42	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C43	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C44	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C45	Not assigned			

( ): Manufacturer's part number
* : Selected at factory

Table 6-23 COMPONENT LIST OF X SELECT, X-Y RECORDER (Z12)

CKT REF	DESCRIPTION	RATING		NOTE
C46	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C47	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C48	Not assigned			
C49	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C50	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C51	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C52	Cer,(CK924C1H104M)	0.1μF,±20%,50V		Q'ty 2 Parallel
C53	Elect,(CE04W1J010)	1μF,±20%,63V		
C54	Elect,(CE04W1J010)	1μF,±20%,63V		
C55	Elect,(CE04W1A470)	47μF,±20%,10V		
C56	Not assigned			
C57	Not assigned			
C58	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
J 1	Connector, (HIF3-30P-2.54DS)			
J 2	Connector, (DF1-5P2.5DSA)			
J 3	Connector, (DF1-15P2.5DSA)			
J 4	Connector,(PI011-07M)			
K 1	Relay,(NF2E-5V)			
Q 1	IC,(μPC804C)			
Q 1	Tr,(2SC2718)			
Q 3	Tr,(2SC2718)			
Q 4	IC,(74LS00)			
Q 5	IC,(74LS73)			
Q 6	IC,(74LS14)			
Q 7	IC,(74LS00)			
Q 8	IC,(74LS08)			
Q 9	Tr,(2SC2718)			
Q10	IC,(μPC804C)			
Q11	IC,(74LS10)			
Q12	IC,(TC40H000P)			
Q13	IC,(74LS04)			
Q14	IC,(74LS27)			
Q15	IC,(TC4066BP)			
Q16	IC,(TC4066BP)			
Q17	IC,(TC4066BP)			
Q18	IC,(TC4066BP)			

( ): Manufacturer's part number
* : Selected at factory

Table 6-23 COMPONENT LIST OF X SELECT, X-Y RECORDER (Z12)

CKT REF	DESCRIPTION	RATING		NOTE
Q19	IC,(TC4066BP)			
Q20	Not assigned			
Q21	IC,(74LS04)			
Q22	IC,(μPC251C)			
Q23	Not assigned			
Q24	IC,(TC4066BP)			
Q25	IC,(μPC251C)			
Q26	IC,(TC4066BP)			
Q27	IC,(μPC804C)			
Q28	IC,(74LS32)			
Q29	IC,(μPC251C)			
Q30	Di,(1S953)			
Q31	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q32	Di,(1S953)			
Q33	Di,(1S953)			
Q34	Di,(1S953)			
Q35	Di,breakdown,(RD6.2EB)	5.8 to 6.6V,400mW		
Q36	Di,(1S953)			
Q37	IC,(μPC251C)			
Q38	IC,(74LS00)			
Q39				
Q39	IC,(74LS00)			
Q40	IC,(TC40H000P)			
Q41	Not assigned			
Q42	Di,(1S953)			
Q43	Tr,(2SC2718)			
Q44	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,500mW		
Q45	Tr,(2SC2718)			
Q46	LED,(TLG226)			
Q47	Di,(1S953)			
Q48	Di,(1S953)			
Q49	Di,(1S953)			
Q50	Tr,(2SC2718)			
Q51	Tr,(2SA1151)			
Q52	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q53	Di,(1S953)			
Q54	Not assigned			
Q55	Not assigned			
Q56	Di,(1S953)			
Q57	Not assigned			
Q58	IC,(TC4053BP)			
Q59	LED,(TLG226)			
Q60	IC,(74LS04)			

( ): Manufacturer's part number
* : Selected at factory

Table 6-23 COMPONENT LIST OF X SELECT, X-Y RECORDER (Z12)

CKT REF	DESCRIPTION	RATING		NOTE
R 1	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R 2	CF,(ARD25T473J)	47kΩ,±5%,1/4W		
R 3	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R 4	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R 5	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R 6	CF,(ARD25T473J)	47kΩ,±5%,1/4W		
R 7	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R 8	CF,(ARD25T683J)	68kΩ,±5%,1/4W		
R 9	CF,(ARD25T683J)	68kΩ,±5%,1/4W		
R10	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R11	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R12	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R13	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R14	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R15	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R16	CF,(ARD25T121J)	120Ω,±5%,1/4W		
R17	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R18	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R19	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R20	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R21	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R22	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R23	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R24	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R25	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R26	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R27	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R28	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R29	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R30	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R31	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R32	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R33	CF,(ARD25T * J)	100Ω to 22kΩ,±5%, 1/4W		Q'ty 0 or 1, *
R34	CF,(ARD25T683J)	68kΩ,±5%,1/4W		
R35	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R36	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R37	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R38	Not assigned			
R39	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R40	Not assigned			
R41	MF,(RN14K2E1002D)	10kΩ,±0.5%,1/4W		
R42	MF,(RN14K2E1002D)	10kΩ,±0.5%,1/4W		
R43	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R44	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R45	Var,MF,(RJ-6P 1kΩ)	1kΩ,1/2W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-23 COMPONENT LIST OF X SELECT, X-Y RECORDER (Z12)

CKT REF	DESCRIPTION	RATING		NOTE
R46	Not assigned			
R47	Not assigned			
R48	Not assigned			
R49	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R50	Var,MF,(RJ-6P 100kΩ)	100kΩ,1/2W		
R51	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R52	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R53	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R54	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R55	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R56	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R57	CF,(ARD25T333J)	33kΩ,±5%,1/4W		
R58	CF,(ARD25T333J)	33kΩ,±5%,1/4W		
R59	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R60	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R61	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R62	CF,(ARD25T224J)	220kΩ,±5%,1/4W		
R63	CF,(ARD25T823J)	82kΩ,±5%,1/4W		
R64	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R65	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R66	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R67	CF,(ARD25T473J)	47kΩ,±5%,1/4W		
R68	CF,(ARD25T823J)	82kΩ,±5%,1/4W		
R69	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R70	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R71	CF,(ARD25T562J)	5.6kΩ,±5%,1/4W		
R72	MF,(RN14K2E4991D)	4.99kΩ,±0.5%,1/4W		
R73	MF,(RN14K2E4991D)	4.99kΩ,±0.5%,1/4W		
R74	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R75	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R76	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R77	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R78	CF,(ARD25T474J)	470kΩ,±5%,1/4W		
R79	CF,(ARD25T682J)	6.8kΩ,±5%,1/4W		
R80	Not assigned			
R81	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R82	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R83	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R84	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R85	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R86	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R87	Var,MF,(RJ-6P 20kΩ)	20kΩ,1/2W		
R88	Var,MF,(RJ-6P 20kΩ)	20kΩ,1/2W		
R89	Not assigned			
R90	Not assigned			

( ): Manufacturer's part number
* : Selected at factory

Table 6-23 COMPONENT LIST OF X SELECT, X-Y RECORDER (Z12)

CKT REF	DESCRIPTION	RATING		NOTE
R91	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R92	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R93	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R94	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R95	Not assigned			
R96	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R97	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R98	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R99	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R100	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R101	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R102	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R103	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R104	Not assigned			
R105	CF,(ARD25T474J)	470kΩ,±5%,1/4W		
R106	CF,(ARD25T824J)	820kΩ,±5%,1/4W		
R107	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R108	MF,(RN14K2E1002D)	10kΩ,±0.5%,1/4W		
R109	Var,MF,(RJ-6P 10kΩ)	10kΩ,±1/2W		
R110	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R111	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R112	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R113	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R114	Not assigned			
R115	Var,MF,(VG161P20SB 100kΩM)	100kΩ,1/2W		
R116	Var,MF,(RG161P20SB1 100kΩM)	100kΩ,1/2W		
R117	PMTR,WW,(44R58742A)	20kΩ		
R118	MF,(RN14K2E2000D)	200Ω,±0.5%,1/4W		
R119	MF,(RN14K2E2000D)	200Ω,±0.5%,1/4W		
R120	MF,(RN14K2E2001D)	2kΩ,±0.5%,1/4W		
R121	MF,(RN14K2E2001D)	2kΩ,±0.5%,1/4W		
R122	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R123	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R124	CF,(ARD25T682J)	6.8kΩ,±5%,1/4W		
R125	CF,(ARD25T682J)	6.8kΩ,±5%,1/4W		
R126	Var,MF,(RJ-6P 10kΩ)	10kΩ,1/2W		
R127	Var,MF,(RJ-6P 10kΩ)	10kΩ,1/2W		
R128	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R129	CF,(ARD25T562J)	5.6kΩ,±5%,1/4W		
R130	Not assigned			
R131	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R132	CF,(ARD25T682J)	6.8kΩ,±5%,1/4W		
R133	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R134	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R135	CF,(ARD25T473J)	47kΩ,±5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-23 COMPONENT LIST OF X SELECT, X-Y RECORDER (Z12)

CKT REF	DESCRIPTION	RATING		NOTE
R136	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R137	Not assigned			
R138	Not assigned			
R139	Not assigned			
R140	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R141	CF,(ARD25T333J)	33kΩ,±5%,1/4W		
R142	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R143	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R144	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
S 1	Pushbutton,(44S78229)			
S 2	Not assigned			
S 3	Not assigned			
S 4	Not assigned			
S 5	Pushbutton,(1F2U0A)			

( ): Manufacturer's part number
* : Selected at factory

Table 6-24 COMPONENT LIST OF CRT DRIVER (Z13)

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Elect,(CE04W1V220)	22μF,±20%,35V		
C 2	Elect,(CE04W1V220)	22μF,±20%,35V		
C 3	Elect,(CE04W1V220)	22μF,±20%,35V		
C 4	Cer,(CC924CH1H471J)	470pF,±5%,50V		
C 5	Cer,(CC924CH1H471J)	470pF,±5%,50V		
C 6	Not assigned			
C 7	Not assigned			
C 8	Elect,(CE04W1E101)	100μF,±20%,25V		
C 9	Elect,(CE04W1E101)	100μF,±20%,25V		
C10	Not assigned			
C11	Plast,(ECQ-M1H222KZ)	2200pF,±10%,50V		
C12	Plast,(ECQ-M1H222KZ)	2200pF,±10%,50V		
C13	Elect,(KX100VB-3.3)	3.3μF,100V		
C14	Elect,(KX100VB-3.3)	3.3μF,100V		
C15	Elect,(KX100VB-3.3)	3.3μF,100V		
C16	Elect,(KX100VB-3.3)	3.3μF,100V		
C17	Plast,(ECQ-M1H104KZ)	0.1μF,±10%,50V		
C18	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V		
C19	Not assigned			
C20	Cer,(DE1105E472Z1KV)	4700pF,+80/-20%,1kV		
C21	Cer,(DE1105E472Z1KV)	4700pF,+80/-20%,1kV		
C22	Cer,(DE1105E472Z1KV)	4700pF,+80/-20%,1kV		
C23	Cer,(DE1610E472Z 3.15KVDC)	4700pF,+80/-20%, 3.15kV		
C24	Cer,(DE1207E222Z 3.15KV)	2200pF,+80/-20%, 3.15kV		
C25	Cer,(DE1207E222Z 3.15KV)	2200pF,+80/-20%, 3.15kV		
C26	Cer,(CC924CH1H101J)	100pF,±5%,50V		
C27	M Plast,(CF922N2E474K)	0.47μF,±10%,250V		
J 1	Connector, (DF1-15P2.5DSA)			
J 2	Connector,(PI011-03M)			
J 3	Connector,(PI011-02M)			
J 4	Connector,(PI011-07M)			
J 5	Connector,(PI011-07M)			
L 1	Microinductor, (LH1-471K)	470μH		
L 2	Microinductor, (LH1-471K)	470μH		

( ): Manufacturer's part number
* : Selected at factory

Table 6-24 COMPONENT LIST OF CRT DRIVER (Z13)

CKT REF	DESCRIPTION	RATING		NOTE
Q 1	IC,(μPC258C)			
Q 2	IC,(TC4053BP)			
Q 3	Tr,(2SA1151)			
Q 4	Tr,(2SC2718)			
Q 5	Tr,(2SC2718)			
Q 6	Tr,(μPA39A)			
Q 7	Not assigne			
Q 8	Tr,(2SC1279)			
Q 9	Tr,(2SC1279)			
Q10	Tr,(2SC1279)			
Q11	Tr,(2SC1279)			
Q12	Not assigned			
Q13	Tr,(μPA39A)			
Q14	Not assigned			
Q15	Tr,(2SC1279)			
Q16	Tr,(2SC1279)			
Q17	Tr,(2SC1279)			
Q18	Tr,(2SC1279)			
Q19	Not assigned			
Q20	Not assigned			
Q21	Di,(1S953)			
Q22	Tr,(2SC2718)			
Q23	Tr,(2SC2718)			
Q24	Tr,(2SA1151)			
Q25	Photo coupler, (PS2006B)			
Q26	Di,(1S953)			
Q27	Di,(1S953)			
Q28	Tr,(2SD297)			
Q29	Tr,(2SD297)			
Q30	Not assigned			
Q31	Di,(1S1834)			
Q32	Di,(1S1834)			
Q33	Di,(1S1834)			
Q34	Di,(1S1834)			
Q35	Tr,(2SA845A Ⓗ)			
Q36	Tr,(2SA845A Ⓗ)			
Q37	Tr,(2SA845A Ⓗ)			
Q38	Tr,(2SA845A Ⓗ)			
Q39	Tr,(2SA845A Ⓗ)			
Q40	Tr,(2SA845A Ⓗ)			
Q41	Not assigned			
Q42	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q43	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q44	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q45	Tr,(2SC1279)			

( ): Manufacturer's part number
* : Selected at factory

Table 6-24 COMPONENT LIST OF CRT DRIVER (Z13)

CKT REF	DESCRIPTION	RATING		NOTE
Q46	Di,(ES01F)			
Q47	Di,(ES01F)			
Q48	Di,(ES01F)			
Q49	Di,breakdown, (RD5.1E(3))	4.95 to 5.2V,400mW		
Q50	Di,breakdown, (RD5.1E(3))	4.95 To 5.2V,400mW		
Q51	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q52	Di,breakdown,(RD9.1EB)	8.5 to 9.6V,400mW		
Q53	Di,(1S953)			
Q54	Di,(1S953)			
R 1	Var,MF,(RG161P20SB 10kΩM)	10kΩ,1/2W		
R 2	Not assigned			
R 3	Var,MF,(RG161P20SB 20kΩM)	20kΩ,1/2W		
R 4	Var,MF,(RG161P20SB 1kΩM)	1kΩ,1/2W		
R 5	CF,(ARD25T392J)	3.9kΩ,±5%,1/4W		
R 6	CF,(ARD25T392J)	3.9kΩ,±5%,1/4W		
R 7	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R 8	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R 9	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R10	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R11	Not assigned			
R12	Var,MF,(RJ-6P 500Ω)	500Ω,1/2W		
R13	Var,MF,(RJ-6P 100Ω)	100Ω,1/2W		
R14	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R15	CF,(ARD25T272J)	2.7kΩ,±5%,1/4W		
R16	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R17	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R18	CF,(ARD25T272J)	2.7kΩ,±5%,1/4W		
R19	Var,MF,(RJ-6P 5kΩ)	5kΩ,1/2W		
R20	Not assigned			
R21	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R22	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R23	CF,(ARD25T182J)	1.8kΩ,±5%,1/4W		
R24	CF,(ARD25T182J)	1.8kΩ,±5%,1/4W		
R25	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R26	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R27	CF,(ARD25TB21J)	820Ω,±5%,1/4W		
R28	CF,(ARD25TB21J)	820Ω,±5%,1/4W		
R29	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R30	CF,(ARD25T105J)	1MΩ,±5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-24 COMPONENT LIST OF CRT DRIVER (Z13)

CKT REF	DESCRIPTION	RATING		NOTE
R31	Not assigned			
R32	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R33	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R34	CF,(ARD25T563J)	56kΩ,±5%,1/4W		
R35	CF,(ARD25T563J)	56kΩ,±5%,1/4W		
R36	Not assigned			
R37	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R38	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R39	Var,MF,(RJ-6P 5kΩ)	5kΩ,1/2W		
R40	Not assigned			
R41	Var,MF,(RJ-6P 2kΩ)	2kΩ,1/2W		
R42	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R43	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R44	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R45	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R46	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R47	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R48	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R49	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R50	Not assigned			
R51	CF,(ARD25T154J)	150kΩ,±5%,1/4W		
R52	CF,(ARD25T154J)	150kΩ,±5%,1/4W		
R53	CF,(ARD25T823J)	82kΩ,±5%,1/4W		
R54	CF,(ARD25T823J)	82kΩ,±5%,1/4W		
R55	Not assigned			
R56	Not assigned			
R57	CF,(ARD25T123J)	12kΩ,±5%,1/4W		
R58	CF,(ARD25T183J)	18kΩ,±5%,1/4W		
R59	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R60	Not assigned			
R61	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R62	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R63	Var,MF,(RJ-6P 1kΩ)	1kΩ,1/2W		
R64	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R65	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R66	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R67	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R68	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R69	Not assigned			
R70	Not assigned			
R71	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R72	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R73	Not assigned			
R74	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R75	CF,(ARD25T103J)	10kΩ,±5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-24 COMPONENT LIST OF CRT DRIVER (Z13)

CKT REF	DESCRIPTION	RATING		NOTE
R76	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R77	CF,(ARD25T153J)	15kΩ,±5%,1/4W		
R78	CF,(ARD25T363J)	36kΩ,±5%,1/4W		
R79	CF,(ARD25T562J)	5.6kΩ,±5%,1/4W		
R80	Not assigned			
R81	CF,(ARD25T * J)	1kΩ to 1M ,±5%,1/4W		Q'ty 0 or 1, *
R82	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R83	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R84	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R85	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R86	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R87	CF,(ARD25T224J)	220kΩ,±5%,1/4W		
R88	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R89	MF,(RH1HVS1.2MΩJ)	1.2MΩ,±5%,1W		
R90	MF,(RH2HVS3MΩJ)	3MΩ,±5%,2W		
R91	Var,MF,(RG161N15SB 1MΩM)	1MΩ,1/2W		
R92	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R93	MF,(RN14K2H151J)	150Ω,±5%,1/2W		
R94	MF,(RN14K2H151J)	150Ω,±5%,1/2W		
R95	Var,MF,(RJ-6P 100kΩ)	100kΩ,1/2W		
R96	Not assigned			
R97	Not assigned			
R98	Not assigned			
R99	Var,MF,(RJ-6P 100kΩ)	100kΩ,1/2W		
R100	Not assigned			
R101	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R102	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R103	Var,MF,(RJ-6P 10kΩ)	10kΩ,1/2W		
R104	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R105	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R106	CF,(ARD25T * J)	100Ω to 10kΩ,±5%, 1/4W		Q'ty 0 or 1, *
R107	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R108	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
S 1	Pushbutton,(1F2UEE)			
S 2	Pushbutton,(1F2UEE)			
T 1	Trans,(439T23553)			

( ): Manufacturer's part number
* : Selected at factory

Table 6-24 COMPONENT LIST OF CRT DRIVER (Z13)

CKT REF	DESCRIPTION	RATING		NOTE
Z 1	Rectifier, high voltage, (MSL4532)			

( ). Manufacturer's part number
* : Selected at factory

Table 6-25 COMPONENT LIST OF POWER SUPPLY (Z14)

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Elect,(CE04W1V471)	470μF,±20%,35V		
C 2	Plast,(ECQ-M1H 102KZ)	1000pF,±10%,50V		
C 3	Plast,(ECQ-M1H 473KZ)	0.047μF,±10%,50V		
C 4	Elect,(CE04W1E470)	47μF,±20%,25V		
C 5	Plast,(ECQ-M1H 102KZ)	1000pF,±10%,50V		
C 6	Elect,(CE04W1A470)	47μF,±20%,10V		
C 7	Elect,(CE04W1A470)	47μF,±20%,10V		
C 8	Plast,(ECQ-M1H 102KZ)	1000pF,±10%,50V		
C 9	Elect,(CE04W1A470)	47μF,±20%,10V		
C 10	Elect,(CE04W1A470)	47μF,±20%,10V		
C 11	Not assigned			
C 12	Plast,(ECQ-M1H 102KZ)	1000pF,±10%,50V		
C 13	Plast,(ECQ-M1H 473KZ)	0.047μF,±10%,50V		
C 14	Elect,(CE04W1E470)	47μF,±20%,25V		
C 15	Elect,(CE04W1A470)	47μF,±20%,10V		
C 16	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C 17	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C 18	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C 19	Elect,(CE04W1A470)	47μF,±20%,10V		
C 20	Elect,(CE04W1A470)	47μF,±20%,10V		
C 21	Elect,(CE04W1A101)	100μF,±20%,10V		
F 1	Fuse,(MF51NN250V 2A DC01)	2A,250V		
F 2	Fuse,(MF51NN250V 2A DC01)	2A,250V		
F 3	Fuse,(MF51NN250V 2A DC01)	2A,250V		
F 4	Fuse,(MF51NN250V 2A DC01)	2A,250V		
J 1	Connector,(U-PB1519)	15 pins		
J 2	Connector,(U-PB1521)	15 pins		
J 3	Connector,(U-PB1519)	15 pins		
J 4	Connector,(U-PB1019)	10 pins		
M 1	Timer,(TM-O)			

( ): Manufacturer's part number
* : Selected at factory

Table 6-25 COMPONENT LIST OF POWER SUPPLY (Z14)

CKT REF	DESCRIPTION	RATING		NOTE
Q 1	IC,(μPC151C)			
Q 2	Tr,Si,NPN,(2SC2718)			
Q 3	Di,Si,(V03G)			
Q 4	Di,breakdown,(RD5.1E (3))	4.8 to 5.7V,400mW		
Q 5	IC,(μPC251C)			
Q 6	IC,(μPC251C)			
Q 7	Di,breakdown,(RD5.1E (3))	4.8 to 5.7V,400mW		
Q 8	IC,(μPC16305H)			
Q 9	Tr,Si,NPN,(2SC2199)			
Q 10	Di,breakdown,(RD6.2EB)	5.8 to 6.6V,400mW		
Q 11	Di,Si,(1S953)			
Q 12	Rectifier,RB-402-LFD			
Q 13	Di,breakdown,(RD7.5EB)	7.0 to 7.9V,400mW		
R 1	CF,(ARD25T153J)	15kΩ,±5%,1/4W		
R 2	Var,MF,(RJ-6P 1kΩ)	1kΩ,1/2W		
R 3	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R 4	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R 5	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R 6	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R 7	MF,(RN14K2E1402D)	14kΩ,±0.5%,1/4W		
R 8	MF,(RN14K2E1002D)	10kΩ,±0.5%,1/4W		
R 9	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R 10	Not assigned			
R 11	MF,(RN14K2E1402D)	14kΩ,±0.5%,1/4W		
R 12	MF,(RN14K2E1002D)	10kΩ,±0.5%,1/4W		
R 13	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R 14	Var,MF,(RJ-6P 1kΩ)	1kΩ,1/2W		
R 15	CF,(ARD25T153J)	15kΩ,±5%,1/4W		
R 16	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R 17	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R 18	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R 19	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R 20	Not assigned			
R 21	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R 22	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R 23	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R 24	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R 25	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R 26	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R 27	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R 28	CF,(ARD25T471J)	470Ω,±5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-25 COMPONENT LIST OF POWER SUPPLY (Z14)

CKT REF	DESCRIPTION	RATING		NOTE
R 29	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R 30	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R 31	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-26 COMPONENT LIST OF AVG (Z15)

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C 2	Not assigned			
C 3	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C 4	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C 5	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C 6	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C 7	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C 8	Not assigned			
C 9	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C10	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C11	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C12	Not assigned			
C13	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C14	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C15	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C16	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C17	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C18	Not assigned			
C19	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C20	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C21	Cer,(CC924CH1H221J)	220pF,±5%,50V		
C22	Elect,(CE04W1V220)	22μF,±20%,35V		
C23	Not assigned			
C24	Not assigned			
C25	Not assigned			
C26	Not assigned			
C27	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C28	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C29	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C30	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C31	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C32	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C33	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C34	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C35	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C36	Elect,(CE04W1A470)	47μF,±20%,10V		
C37	Elect,(CE04W1A470)	47μF,±20%,10V		
C38	Elect,(CE04W1A470)	47μF,±20%,10V		
C39	Cer,(CC924CH1H471J)	470pF,±5%,50V		
C40	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C41	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C42	Cer,(CC924CH1H471J)	470pF,±5%,50V		

( ): Manufacturer's part number
* : Selected at factory

Table 6-26 COMPONENT LIST OF AVG (Z15)

CKT REF	DESCRIPTION	RATING		NOTE
J 1	Connector,(U-SA1501)			
J 2	Connector,(U-SA2201)			
Q 1	IC,(74LS283)			
Q 2	IC,(74LS283)			
Q 3	IC,(74LS283)			
Q 4	IC,(74LS367A)			
Q 5	IC,(74LS367A)			
Q 6	IC,(HM6116P-2)			
Q 7	IC,(HM6116P-2)			
Q 8	IC,(74LS174)			
Q 9	IC,(74LS174)			
Q10	IC,(74LS174)			
Q11	IC,(74LS174)			
Q12	IC,(74LS174)			
Q13	IC,(74LS174)			
Q14	IC,(μPC624D)			
Q15	IC,(μPC624D)			
Q16	IC,(μPC624D)			
Q17	IC,(μPC624D)			
Q18	IC,(μPC803C)			
Q19	IC,(74LS174)			
Q20	IC,(74LS174)			
Q21	IC,(74LS174)			
Q22	IC,(74LS174)			
Q23	IC,(μPC624D)			
Q24	IC,(μPC624D)			
Q25	IC,(μPC624D)			
Q26	IC,(μPC624D)			
Q27	IC,(μPC803C)			
Q28	IC,(74LS293)			
Q29	IC,(TC4040BP)			
Q30	IC,(74154)			
Q31	IC,(74LS00)			
Q32	IC,(TC40H000P)			
Q33	Di,(1S953)			
Q34	IC,(74LS21)			
Q35	IC,(74LS21)			
Q36	Di,breakdown, (RD5.1E(3))	4.95 to 5.2V,400mW		

( ): Manufacturer's part number
* : Selected at factory

Table 6-26 COMPONENT LIST OF AVG (Z15)

CKT REF	DESCRIPTION	RATING		NOTE
R 1	MF,(RN14K2E6491D)	6.49kΩ,±0.5%,1/4W		
R 2	MF,(RN14K2E1212D)	12.1kΩ,±0.5%,1/4W		
R 3	MF,(RN14K2E2491D)	2.49kΩ,±0.5%,1/4W		
R 4	MF,(RN14K2E6491D)	6.49kΩ,±0.5%,1/4W		
R 5	MF,(RN14K2E6491D)	6.49kΩ,±0.5%,1/4W		
R 6	MF,(RN14K2E6491D)	6.49kΩ,±0.5%,1/4W		
R 7	MF,(RN14K2E25R5D)	25.5Ω,±0.5%,1/4W		
R 8	MF,(RN14K2E6491D)	6.49kΩ,±0.5%,1/4W		
R 9	MF,(RN14K2E6491D)	6.49kΩ,±0.5%,1/4W		
R10	MF,(RN14K2E1212D)	12.1kΩ,±0.5%,1/4W		
R11	MF,(RN14K2E2491D)	2.49kΩ,±0.5%,1/4W		
R12	MF,(RN14K2E6491D)	6.49kΩ,±0.5%,1/4W		
R13	MF,(RN14K2E6491D)	6.49kΩ,±0.5%,1/4W		
R14	MF,(RN14K2E6491D)	6.49kΩ,±0.5%,1/4W		
R15	MF,(RN14K2E25R5D)	25.5Ω,±0.5%,1/4W		
R16	MF,(RN14K2E6491D)	6.49kΩ,±0.5%,1/4W		
R17	Not assigned			
R18	Not assigned			
R19	Not assigned			
R20	Not assigned			
R21	Not assigned			
R22	MF,(RN14K2E6491D)	6.49kΩ,±0.5%,1/4W		
R23	MF,(RN14K2E1212D)	12.1kΩ,±0.5%,1/4W		
R24	MF,(RN14K2E2491D)	2.49kΩ,±0.5%,1/4W		
R25	MF,(RN14K2E6491D)	6.49kΩ,±0.5%,1/4W		
R26	MF,(RN14K2E6491D)	6.49kΩ,±0.5%,1/4W		
R27	MF,(RN14K2E6491D)	6.49kΩ,±0.5%,1/4W		
R28	MF,(RN14K2E25R5D)	25.5Ω,±0.5%,1/4W		
R29	MF,(RN14K2E6491D)	6.49kΩ,±0.5%,1/4W		
R30	MF,(RN14K2E6491D)	6.49kΩ,±0.5%,1/4W		
R31	MF,(RN14K2E1212D)	12.1kΩ,±0.5%,1/4W		
R32	MF,(RN14K2E2491D)	2.49kΩ,±0.5%,1/4W		
R33	MF,(RN14K2E6491D)	6.49kΩ,±0.5%,1/4W		
R34	MF,(RN14K2E6491D)	6.49kΩ,±0.5%,1/4W		
R35	MF,(RN14K2E6491D)	6.49kΩ,±0.5%,1/4W		
R36	MF,(RN14K2E25R5D)	25.5Ω,±0.5%,1/4W		
R37	MF,(RN14K2E6491D)	6.49kΩ,±0.5%,1/4W		
R38	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R39	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R40	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R41	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R42	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R43	Var,MF,(RJ-6P 2kΩ)	2kΩ,1/2W		
R44	Var,MF,(RJ-6P 500Ω)	500Ω,1/2W		
R45	Var,MF,(RJ-6P 2kΩ)	2kΩ,1/2W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-26 COMPONENT LIST OF AVG (Z15)

CKT REF	DESCRIPTION	RATING		NOTE
R46	Var,MF,(RJ-6P 500Ω)	500Ω,1/2W		
R47	Var,MF,(RJ-6P 2kΩ)	2kΩ,1/2W		
R48	Var,MF,(RJ-6P 500Ω)	500Ω,1/2W		
R49	Var,MF,(RJ-6P 2kΩ)	2kΩ,1/2W		
R50	Var,MF,(RJ-6P 500Ω)	500Ω,1/2W		

( ): Manufacturer's part number
* : Selected at factory

Table 6-27 COMPONENT LIST OF GP-IB BOARD (Z8) (OPTION)

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer,(CK924F1H1042)	0.1μF,+80/-20%,50V		
C 2	Cer,(CK924F1H1042)	0.1μF,+80/-20%,50V		
C 3	Cer,(CK924F1H1042)	0.1μF,+80/-20%,50V		
C 4	Cer,(CK924F1H1042)	0.1μF,+80/-20%,50V		
C 5	Cer,(CK924F1H1042)	0.1μF,+80/-20%,50V		
C 6	Cer,(CK924F1H1042)	0.1μF,+80/-20%,50V		
C 7	Cer,(CK924F1H1042)	0.1μF,+80/-20%,50V		
C 8	Cer,(CK924F1H1042)	0.1μF,+80/-20%,50V		
C 9	Cer,(CK924F1H1042)	0.1μF,+80/-20%,50V		
C10	Not assigned			
C11	Not assigned			
C12	Cer,(CK924F1H1042)	0.1μF,+80/-20%,50V		
C13	Cer,(CK924F1H1042)	0.1μF,+80/-20%,50V		
C14	Cer,(CK924F1H1042)	0.1μF,+80/-20%,50V		
C15	Cer,(CK924F1H1042)	0.1μF,+80/-20%,50V		
C16	Cer,(CK924F1H1042)	0.1μF,+80/-20%,50V		
C17	Cer,(CK924F1H1042)	0.1μF,+80/-20%,50V		
C18	Cer,(CK924F1H1042)	0.1μF,+80/-20%,50V		
C19	Elect,(CE04W1A470)	47μF,±20%,10V		
C20	Cer,(CK924F1H1042)	0.1μF,+80/-20%,50V		
C21	Not assigned			
C22	Cer,(CK924F1H1042)	0.1μF,+80/-20%,50V		
J 1	Connector,(U-SA2201)			
J 2	Connector,(U-SA1501)			
J 3	Connector, (HIF23A-40D-AA30S)			
J 4	Connector, (HIF23A-16D-AA40S)			
Q 1	IC,(74LS244)			
Q 2	IC,(74LS244)			
Q 3	IC,(74LS373)			
Q 4	IC,(74LS244)			
Q 5	IC,(74LS367)			
Q 6	IC,(HM6116P)			
Q 7	IC,(HM6116P)			
Q 8	IC,(TC40H138P)			
Q 9	IC,(TC40H138P)			
Q10	IC,(TC40H032P)			
Q11	IC,(TC40H032P)			
Q12	IC,(TC40H174P)			
Q13	IC,(8291A)			
Q14	IC,(SN74160A)			
Q15	IC,(SN74161A)			

( ): Manufacturer's part number
* : Selected at factory

Table 6-27 COMPONENT LIST OF GP-IB BOARD (Z8) (OPTION)

CKT REF	DESCRIPTION	RATING	NOTE
Q16	IC,(TC40H240P)		
Q17	IC,(TC40H367P)		
Q18	IC,(TC40H244P)		
Q19	IC,(TC40H000P)		
Q20	IC,(EPROM16Kx8-25N)	28 pins	
Q21	Not assigned		
Q22	IC,(74LS373)		
Q23	Not assigned		
Q24	IC,(TC40H074P)		
Q25	IC,(74LS04)		
R 1	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W	
R 2	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W	
R 3	Not assigned		
R 4	Single in-line array, (IHR-8-472JA)	4.7kΩ x 8,1/8W	
R 5	Single in-line array, (IHR-8-472JA)	4.7kΩx8,1/8W	

( ): Manufacturer's part number
* : Selected at factory

Table 6-28 COMPONENT LIST OF CONNECTOR BOARD (Z18)

CKT REF	DESCRIPTION	RATING	NOTE
J 1	Connector, (HIF3-40P-2.54DS)		
J 2	Connector, (57-20240-8D35)		
J 3	Connector, (DD57-20360-9)		
S 1	Switch,(DIP-A(8))		

( ): Manufacturer's part number
* : Selected at factory

Table 6-29 COMPONENT LIST OF CHARACTER DISPLAY (Z19)

CKT REF	DESCRIPTION	RATING	NOTE
C 1	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V	
C 2	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V	
C 3	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V	
C 4	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V	
C 5	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V	
C 6	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V	
C 7	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V	
C 8	Not assigned		
C 9	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V	
C10	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V	
C11	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V	
C12	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V	
C13	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V	
C14	Cer,(CK924C1H104M)	0.1μF,±20%,50V	
C15	Cer,(CC924CH1H101J)	100pF,±5%,50V	
C16	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V	
C17	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V	
C18	Cer,(CK924C1H104M)	0.1μF,±20%,50V	
C19	Cer,(CC924CH1H101J)	100pF,±5%,50V	
C20	Cer,(CK924C1H102M)	1000pF,±20%,50V	
C21	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V	
C22	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V	
C23	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V	
C24	Cer,(CK924C1H102M)	1000pF,±20%,50V	
C25	Cer,(CK924C1H102M)	1000pF,±20%,50V	
C26	Elect,(CE04W1A470)	47μF,±20%,10V	
C27	Elect,(CE04W1V100)	10μF,±20%,35V	
C28	Elect,(CE04W1V100)	10μF,±20%,35V	
C29	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V	
C30	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V	
C31	Cer,(CE04W1A470)	47μF,±20%,10V	
C32	Not assigned		
C33	Not assigned		
C34	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V	
C35	Not assigned		
C36	Not assigned		
C37	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V	
C38	Cer,(CC924CH1H101J)	100pF,±5%,50V	
C39	Cer,(CK924CH1H101J)	100pF,±5%,50V	
C40	Cer,(CK924F1H104FZ)	0.1μF,±1pF,50V	
C41	Cer,(CK924F1H104FZ)	0.1μF,±1pF,50V	
C42	Cer,(CK924F1H104FZ)	0.1μF,±1pF,50V	

( ): Manufacturer's part number
* : Selected at factory

Table 6-29 COMPONENT LIST OF CHARACTER DISPLAY (Z19)

CKT REF	DESCRIPTION	RATING	NOTE
J 1	Connector,(U-SA2201)		
J 2	Connector,(U-SA1501)		
J 3	Connector,(PI021-07M)		
Q 1	IC,(TC40H157P)		
Q 2	IC,(TC40H157P)		
Q 3	IC,(TC40H157P)		
Q 4	IC,(TC40H157P)		
Q 5	IC,(HM6116P-3)		
Q 6	IC,(TC40H374P)		
Q 7	IC,(μPC624D)		
Q 8	IC,(MBM-2764-25)		
Q 9	IC,(TC40H174P)		
Q10	IC,(TC40H244P)		
Q11	IC,(TC40H157P)		
Q12	IC,(TC40H157P)		
Q13	IC,(TC40H374P)		
Q14	IC,(μPC624D)		
Q15	IC,(μPC251C)		
Q16	IC,(TC40H393P)		
Q17	IC,(TC40H393P)		
Q18	IC,(TC40H074P)		
Q19	IC,(TC4053BP)		
Q20	IC,(TC40H000P)		
Q21	IC,(TC40H004P)		
Q22	IC,(TC40H000P)		
Q23	IC,(μPC804C)		
Q24	Di,breakdown, (RD5.1E(3))	4.95 to 5.2V,400mW	
Q25	IC,(TC40H027P)		
Q26	IC,(TC40H000P)		
Q27	Not assigned		
Q28	IC,(TC40H004P)		
Q29	IC,(TC40H157P)		
Q30	IC,(74LS175)		
Q31	Di,breakdown, (RD5.1E(3))	4.95 to 5.2V,400mW	
Q32	Di,breakdown, (RD5.1E(3))	4.95 to 5.2V,400mW	
Q33	IC,(TC4QH000P)		
R 1	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W	
R 2	Single in-line array, (IHR-8-103JA)	10kΩ x 8,1/8W	

( ): Manufacturer's part number
* : Selected at factory

Table 6-29 COMPONENT LIST OF CHARACTER DISPLAY (Z19)

CKT REF	DESCRIPTION	RATING		NOTE
R 3	MF,(RN14K2E1001D)	1kΩ,±0.5%,1/4W		
R 4	MF,(RN14K2E1001D)	1kΩ,±0.5%,1/4W		
R 5	MF,(RN14K2E1001D)	1kΩ,±0.5%,1/4W		
R 6	Var,MF,(RJ-6P 2kΩ)	2kΩ,1/2W		
R 7	MF,(RN14K2E2491D)	2.49kΩ,±0.5%,1/4W		
R 8	Var,MF,(RJ-6P 500Ω)	500Ω,1/2W		
R 9	MF,(RN14K2E1002D)	10kΩ,±0.5%,1/4W		
R10	MF,(RN14K2E2002D)	20kΩ,±0.5%,1/4W		
R11	MF,(RN14K2E4022D)	40.2kΩ,±0.5%,1/4W		
R12	MF,(RN14K2E1001D)	1kΩ,±0.5%,1/4W		
R13	MF,(RN14K2E1002D)	10kΩ,±0.5%,1/4W		
R14	MF,(RN14K2E2002D)	20kΩ,±0.5%,1/4W		
R15	MF,(RN14K2E4022D)	40.2kΩ,±0.5%,1/4W		
R16	MF,(RN14K2E7150D)	715Ω,±0.5%,1/4W		
R17	MF,(RN14K2E1001D)	1kΩ,±0.5%,1/4W		
R18	MF,(RN14K2E1001D)	1kΩ,±0.5%,1/4W		
R19	MF,(RN14K2E1001D)	1kΩ,±0.5%,1/4W		
R20	Var,MF,(RJ-6P 2kΩ)	2kΩ,1/2W		
R21	MF,(RN14K2E2211D)	2.21kΩ,±0.5%,1/4W		
R22	Var,MF,(RJ-6P 500Ω)	500Ω,1/2W		
R23	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R24	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R25	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R26	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R27	MF,(RN14K2E1301D)	1.3kΩ,±0.5%,1/4W		
R28	MF,(RN14K2E1002D)	10kΩ,±0.5%,1/4W		
R29	MF,(RN14K2E2611D)	2.61kΩ,±5%,1/4W		
R30	MF,(RN14K2E2611D)	2.61kΩ,±0.5%,1/4W		
R31	MF,(RN14K2E1002D)	10kΩ,±0.5%,1/4W		
R32	MF,(RN14K2E1431D)	1.43kΩ,±0.5%,1/4W		
R33	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R34	Var,MF,(RJ-6P 5kΩ)	5kΩ,1/2W		
R35	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R36	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R37	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R38	CF,(ARD25T623J)	62kΩ,±5%,1/4W		

( ): Manufacturer's part number

* : Selected at factory